DOCUMENT RESUME

ED 410 454	CE 074 646
TITLE	Body Structure and Function. Teacher Edition.
INSTITUTION	Oklahoma State Dept. of Vocational and Technical Education, Stillwater. Curriculum and Instructional Materials Center.
PUB DATE	1992-00-00
NOTE	881p.; For other Practical Nursing courses, see ED 329 792, ED 380 619, ED 380 637, and CE 074 643-649. Printed on colored paper.
AVAILABLE FROM	Curriculum and Instructional Materials Center, Oklahoma Dept. of Vocational and Technical Education, 1500 West Seventh Avenue, Stillwater, OK 74074 (instructional package, 1 teacher and 10 student editions, order no. HO2033: $123; student edition, HO3035: $6).
PUB TYPE	Guides - Classroom - Teacher (052)
EDRS PRICE	EDRS Price MF6 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Anatomy; Bacteria; Basic Skills; Behavioral Objectives; Biological Sciences; Cardiovascular System; Classroom Techniques; *Competency Based Education; Human Body; Learning Activities; Lesson Plans; Microbiology; Muscular System; Musculoskeletal System; *Nursing Education; Physical Sciences; *Physiology; Postsecondary Education; *Practical Nursing; Skeletal System; State Curriculum Guides; Teaching Guides; Vocational Education

ABSTRACT

This curriculum guide contains the materials required to teach a course in body structure and function. The following topics are covered in the course's 17 instructional units: basic concepts of physical and life sciences; microbiology and bacteriology; the integumentary, skeletal, muscular, digestive, circulatory, respiratory, urinary, central and peripheral nervous, special senses, and reproductive systems; the blood; and the heart. Each unit contains some or all of the following: objective sheets, suggested activities, handouts, supplements, transparency masters, instructional supplements providing suggestions for teaching basic skills, activity sheets, assignment sheets, job sheets, practical tests, written tests, and assignment sheet and test answers. Academic skills training is combined with vocational training throughout the instructional materials. To assist teachers in identifying activities that promote basic skills development, a marking system of simple graphic symbols, or icons, is used to denote which of the following nine general basic skill categories is being emphasized: reading, science, creative thinking/problem solving, writing, oral communication, employability, math, interpersonal skills, and social studies. (MN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 410 454

Body Structure and Function

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CE074 646

BEST COPY AVAILABLE

CIMC

Teacher Edition

93-009312

Oklahoma Department of
Vocational and Technical Education
1500 West Seventh Avenue
Stillwater, OK 74074-4364

HO 1033

Body Structure and Function

Developed by the
Curriculum and Instructional Materials Center
for the Division of Health Occupations Education
Oklahoma Department of Vocational and Technical Education

93-009312

HO 1033

Copyright 1992

Oklahoma Department of Vocational and Technical Education
Curriculum and Instructional Materials Center

All rights reserved.

Printed in the United States of America by the
Oklahoma Department of Vocational and Technical Education
Stillwater, Oklahoma 74074-4364

This publication, or parts thereof, may not be reproduced in any form by photographic, electrostatic, mechanical, or any other methods for any use including information storage and retrieval, without written permission from the publisher.

The Oklahoma Department of Vocational and Technical Education does not discriminate on the basis or race, creed, color, national origin, sex, age, veteran status, or qualified handicap.

TABLE OF CONTENTS

Unit I
Basic Concepts of Physical Science . . . . I - 1

Unit II
Basic Concepts of Life Science . . . . II - 1

Unit III
Microbiology and Bacteriology . . . . III - 1

Unit IV
The Integumentary System . . . . IV - 1

Unit V
The Skeletal System . . . . V - 1

Unit VI
The Muscular System . . . . VI - 1

Unit VII
The Digestive System . . . . VII - 1

UNIT VIII
The Blood . . . . VIII - 1

Unit IX
The Heart . . . . IX - 1

Unit X
The Circulatory System . . . . X - 1

Unit XI
The Respiratory System . . . . XI - 1

Unit XII
The Urinary System . . . . XII - 1

Unit XIII
The Central Nervous System . . . . XIII - 1

Unit XIV
The Peripheral Nervous System . . . . XIV - 1

Unit XV
The Special Senses System . . . . XV - 1

Unit XVI
The Endocrine System . . . . XVI - 1

Unit XVII
The Reproductive System . . . . XVII - 1

FOREWORD

This publication is one of ten comprehensive courses from the Practical Nursing series of competency-based curricula developed by the Curriculum and Instructional Materials Center. It is designed to prepare students for employment by systematically guiding the student's learning activities from the simple to the complex.

A major challenge in the development of these materials has been to identify content and learning activities which will prepare health care practitioners who can function effectively in the rapidly changing health care industry. To meet this challenge, we have relied heavily upon the input and support of health care industry professionals.

The information found in each of the courses in the Practical Nursing series will help the instructor plan and implement a systematic learning process which will ensure student mastery of specific outcomes. Although we believe these publications do provide a systematic, functional curricula, instructors are encouraged to localize, individualize, and supplement these materials to meet specific student/client needs.

Roy Peters, Jr.
State Director

Gail Pearson
State Supervisor
Health Occupations Education

Oklahoma Department of Vocational
and Technical Education

PREFACE

Today's nursing professionals must be prepared to function in many different roles, depending on each individual situation. However, one constant remains–nursing professionals must be prepared to convey information from the doctor to the patient in a concise, coherent manner. This requires a knowledge of the structure and function of the human body. The information presented in *Body Structure and Function* helps prepare the student to perform this task.

The first three units of *Body Structure and Function* introduce the concepts of physical science, life science, and microbiology and bacteriology that the students will need to understand the systems of the human body. Each of the remaining fourteen units presents one of the body's systems. These units discuss the structure and function of a normal, healthy body so that the students will have the background needed to understand the information found in the other sections of the Practical Nursing curriculum. Each of the fourteen units provides the student with the opportunity to demonstrate how each system functions using a method selected from a variety of suggested formats. This helps ensure that every student has an opportunity for success because the student makes the choice that best fits his or her own learning style.

As the population ages, the need for health care and for well-trained health care professionals becomes more and more vital. It is the hope and the intent of the developers of *Body Structure and Function* to provide the students with the skills and knowledge necessary to become these well-trained, highly-qualified health care professionals.

Ann Wolfe
Curriculum Development Specialist
Curriculum and Instructional
Materials Center

ACKNOWLEDGEMENTS

The Curriculum and Instructional Materials Center (CIMC) extends its appreciation to those individuals who played important roles in the development of *Body Structure and Function*.

A generous thank you is extended to the professional individuals who served on the *Body Structure and Function* curriculum task analysis and validation committees. Their contributions of time, talent, and knowledge in determining the content of this publication are greatly appreciated.

Agnes Biggs
Midwest City Regional Hospital
Midwest City, Oklahoma

Patricia Franklin
Kimberly Quality Care
Stillwater, Oklahoma

Cheryl Finney
Stillwater Medical Center
Stillwater, Oklahoma

Lisa Tillman
Office of Dr. Susan Bullard
Stillwater, Oklahoma

Thank you is also extended to the vocational educators who served on the *Body Structure and Function* curriculum committees. Their expert input on vocational instructional methods is greatly appreciated.

Judy Horn
Central Oklahoma AVTS
Drumright, Oklahoma

Radonna Tims
Tulsa County AVTS
Tulsa, Oklahoma

We also thank the State Director, Dr. Roy Peters, Jr., and the Assistant State Director, Dr. Charles O. Hopkins, for their continued support throughout this project.

The area vocational-technical school administrators who supported instructor participation in this project also deserve a special thank you.

Mr. John Hopper
Central Oklahoma AVTS
Drumright, Oklahoma

Dr. Gene Callahan
Tulsa County AVTS
Tulsa, Oklahoma

Oklahoma Department of Vocational and Technical Education Health Occupations Education staff who provided leadership and direction on this project also deserve special recognition.

Gail Pearson
State Supervisor
Health Occupations Education

Jennifer Phillips
Assistant State Supervisor
Health Occupations Education

Special recognition is expressed to Sandra Williams, writing contractor, for her work on this publication.

Special thanks go to Sulinda Moffett, Executive Director, and Dr. Charlotte Rappsilber, former associate Director, of Nursing Education at the Oklahoma Board of Nursing, Oklahoma City, Oklahoma, and to Dr. Lou Ebrite, Teacher Educator, University of Central Oklahoma, Edmond, Oklahoma, for their support and encouragement.

Only through the close cooperation of the Curriculum and Instruction Materials Center staff was this curriculum developed. Sincere thanks are shared with the CIMC coordinators.

Dr. Brenda Stacy
CIMC Coordinator

Dr. Lynna Ausburn
Development Coordinator

Rusty Muns
Audiovisual Coordinator

Kathleen Kincaid
Resale Coordinator

Special appreciation is offered to the numerous other individuals on the CIMC staff who functioned in supportive roles throughout the development of the *Body Structure and Function* curriculum: Brenna Tillman, Publications Supervisor; Darlene Cocanougher Shelton, Format Specialist; Terri Tomson, CIMC secretary; and Charlotte Tarkington, Permissions Secretary.

Special recognition and thanks are also extended to other individuals within the Oklahoma Department of Vocational and Technical Education: Darrell Stiles and his staff at the CIMC warehouse; Noel Wilcoxson, Frosty Foster, Diane Ensign, Danny Darrow, and the staff at the ODVTE Print Shop; Rose Primeaux and the staff in the Word Processing Center; and Bob Davis and the artists in the ODVTE Art Department.

Finally, a big thank you to all the other curriculum development specialists and technical writers who offered their support during this project.

Ann Wolfe
Curriculum Development Specialist
Curriculum and Instructional
Materials Center

USE OF THIS PUBLICATION

INSTRUCTIONAL UNIT

Body Structure and Function contains seventeen units. Each instructional unit includes some or all of the basic components of a unit of instruction: performance objectives, suggested activities for the teacher, Extensions and Options, information sheets, job sheets, practical tests, written tests, and answers to assignment sheets, and written test all of which are included in the instructor edition. The student workbook includes the objective sheets, information sheets, supplements, activity sheets, assignment sheets, and job sheets. Practical tests and written tests may be duplicated for classroom use or additional copies may be purchased by calling 1-800-654-4502, in Oklahoma 1-800-522-5810, ext. 589.

All of the unit components "zero in" on measurable and observable learning outcomes. Instructors are encouraged to supplement, personalize, localize, and motivate with these materials to develop a complete teaching/learning process.

Units of instruction are designed for use in more than one lesson or class period of instruction. Careful study of each unit of instruction by the instructor will help him or her determine the following:

- Amount of material that can be covered in each class period.
- Skills that must be demonstrated.
  - Supplies and equipment needed
  - Amount of class time needed for demonstrations
  - Amount of time needed for student practice
- Supplementary materials, including print and non-print media, that must be ordered.
- Resource people who must be contacted.

Objective Sheet (white pages)

Each unit of instruction is based on the performance needed for successful employment in an occupational area. Performance objectives are stated in two forms: unit objectives, stating the subject matter to be covered in a unit of instruction, and specific objectives stating the performance necessary to reach the unit objective.

The unit objective states the overall goal of the unit. It tells what the student should be able to do and what standard will be used to see whether the student can do it. Specific objectives outline the teaching sequence of the competencies required to meet the unit objective.

The objectives should be provided for students and stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objective can also help determine teaching strategies and instructional methods. Instructors should prepare for each unit by deciding how each objective can be best taught.

Instructors should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the instructor should remember to supply the needed information, assignment and/or job sheets, and criterion test items.

Suggested Activities (pink pages) – **Instructor's Edition only**

This component is included only in instructor material. The suggested activities page assists the instructor during the preparation stage of the teaching/learning process by providing suggestions for delivery, application, and evaluation during the instructional process. The instructor should read the suggested activities before teaching the units to allow time to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the instructor will vary according to the particular unit.

References used in the development of each unit are listed in the "Suggested Resources" section, along with print and non-print media that may be used to teach the unit. These materials can be used by the instructor to supplement his or her knowledge of the subject area or to help students with particular interests or occupational objectives in the area covered.

Extensions and Options (white pages) — **Instructor's Edition only**

This component provides discretionary information, teaching aids, or additional material for teacher preparation. Some of the materials are written for the student to use if the teacher wishes to use them; others are for teacher information only. Sometimes the material covered on these pages is considered controversial. These pages are completely optional; the teacher decides whether or not to use them.

Information Sheets (green pages)

The information sheet provides "must know" content essential for meeting the cognitive objectives on the knowledge and comprehension level of Bloom's taxonomy of educational objectives. The information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. It also may be used for coordination activities and advisory committees.

Students should read the information sheet before the information is discussed in class. Space is provided in margins for students and instructors to ad notes that supplement, localize, personalize, or provide motivation for each unit.

The information sheet may also include sections that provide additional information or alerts. These should be discussed carefully and thoroughly. **Notes** are short verbal additions to the information sheet that provide nice-to-know and decision-making information. A note may tell the student what to watch for or to consider at a given step. It may explain when a step may not be applicable. Notes offer guidance that may help the student understand the process and do it more efficiently. The words **Notice, Caution, Warning,** and **Danger** warn that the situation has the potential for injury, death, or property damage unless it is completed properly or avoided. **Notices** indicate that property damage could occur, **Cautions** warn that minor or moderate injuries could result, **Warnings** indicate that death or serious injury could result, and **Danger** indicates that death or serious injury will result.

Student Supplements (green pages)

Student supplements include material that provides additional information for understanding the topic. These supplements could include additional data the students might need to complete assignment or job sheets, specialized instructions for problem solving activities, or information in graphic form such as graphs, charts, tables, or forms. Supplements are not tested directly; however they do provide students with information that will assist them in meeting the performance objectives.

Transparency Masters (white pages) – **Instructor's Edition only**

Transparency masters provide information in a special way. The students may see as well as her the materials being presented, this reinforcing the learning process. Transparencies may present new information or they may reinforce information presented in the information or assignment sheets.

Transparencies should be made and placed in the notebook where they will be immediately available for use. Transparencies direct the class's attention to the topic of discussion. They should be left on the screen only when topics shown are under discussion.

Instructional Supplements (pink pages) — **Instructor's Edition only**

Instructional Supplements provide suggestions for teaching the basic skills included in each activity sheet, assignment sheet, or job sheet.

Activity Sheets (tan pages)

The purpose of activity sheets is to provide activities which support several objectives. Activity sheets vary greatly in their number and design from unit to unit. Some activity sheets deal with the student's attitudes and beliefs. These may ask rather personal questions and are only intended for each student's personal use. Some activity sheets may require the student to monitor his or her own actions or other personal variables over a period of time. Answer sheets may or may not be included. Activity sheet answers are on pink pages in the instructor's edition.

Assignment Sheets (tan pages)

Assignment sheets provide students with information and exercises to problems that address learning levels at or above the application level of Bloom's taxonomy. Assignment sheets provide written exercises for instruction and practice of a specific objective. The introduction to the assignment sheet explains how the assignment sheet relates to the subject area and unit objectives and may provide instructional information or refer students to another component for such information. Often, assignment sheets will contain case studies or story problems or other situations in which the student must analyze the circumstances and determine correct responses. Assignment sheets may be given to the students for completion in class or for homework. Answer sheets are provided.

Job Sheets (blue pages)

Job sheets are another important segment of a unit of instruction. The job sheets provide a list of equipment, tools, and materials needed to complete a manipulative or psychomotor skill. They describe a step-by-step procedure to complete each task or job. Diagrams, photographs, and illustration are provided to assist students in achieving the skill.

The instructor should demonstrate the procedure outlines in each job sheet. Further more, the instructor needs to localize the procedure according to the equipment and supplies available in the local lab or shop situation. Job sheets also furnish potential employers with a picture of the skills being taught and the performances they might reasonably expect from a person who has had this vocational instruction.

Practical Tests (yellow pages) – **Instructor's Edition only**

The practical tests are designed to assist the instructor in the evaluation of the psychomotor activities (job sheets). The practical test provides instructors with a valid mechanism for determining a student's level of ability in performing the procedure stated on the job sheet.

Written Test (yellow pages) – **Instructor's Edition only**

This component provides criterion-references evaluation of every objective listed in the unit of instruction. It is crucial to note that both paper-pencil and performance objectives must be evaluated. If objectives have been added, deleted, and modified, appropriate changes should be made on the test.

The test may be written or oral. It is recommended that the tests be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered.

The acceptable response on a unit test, eighty-five (85) percent in most units, may be raised or lowered to fit the topic or students' ability levels. The percentage applies to the overall score, not to each individual question. The final unit grade should be obtained by using the "paper-pencil" score along with teacher evaluations of student demonstrations of the desired skills.

Answers to Assignment Sheets and Written Tests (pink pages) – **Instructor's Edition only**

These components are designed to assist the instructor in evaluation of student performance. They are available in the teacher's edition only.

PAGE NUMBERING

Each publication for the Curriculum and Instructional Materials Center is usually assigned a specific abbreviation. ***Body Structure and Function*** has not been abbreviated. Each unit will be recognized by the unit number in roman numerals. Each unit in the publication begins with page 1. Each page number gives the component name, book title, unit number, and page number within the unit. Since CIMC publications are loose-leaf, this system of page numbering was recently adopted so that pages from different manuals would not get mixed up. The page number for the objective sheet in The Skeletal System, which is unit V, would look like this:

OBJECTIVE SHEET - **Body Structure and Function**
CIMC - V - 1

METHODS OF DISSEMINATING MATERIAL

For best results, provide student materials for each student. Student workbooks contain objective sheets, information sheets, supplements, transparency masters, activity sheets, assignment sheets, and job sheets. Pretest, practical tests, and written tests are packaged separately for students, and can be stored until needed. Students should be allowed to take their materials home at the end of the course.

TEACHING METHODS

Keeping students motivated is a challenge. Supplement the objectives by providing the "why," personal experiences, and current information. If you are going to teach the material in a group setting, prepare for the unit be deciding the best way to teach each objective and allow for student input.

If you are going to follow the plan for individualized instruction, provide opportunities that will allow each student to become involved in planning for and being responsible for his or her own education.

COMPETENCY PROFILES

A competency profile is available for each CIMC publication. Competency profiles document student performance. The profile contains a list of the specific job competencies that a student should achieve before leaving the training program. Profiles should be distributed as required.

DISCLAIMERS, CORRECTIONS, AND SUGGESTIONS

Materials

Please note that suggested resources and references listed in this publication existed when the book was written and printed. The Curriculum and Instructional Materials Center (CIMC) assumes no responsibility for providing these materials and cannot ensure the availability of these materials because the individual vendors, manufacturers, and publishers may discontinue these products at any time.

Safety

CIMC wants to provide vocational instructors and students with materials that are accurate and effective. Although the CIMC strives to maintain the highest standards of development and production, oversights occasionally do occur. CIMC assumes no responsibility for any adverse effects resulting directly or indirectly from the information, suggested procedures, undetected errors, or the reader's misunderstanding of the information presented.

Corrections and Suggestions

If you find any errors in this or other CIMC publications, or have suggestions for improving their usefulness in vocational programs, please notify the CIMC staff. One easy way of pointing out errors is to make a photocopy of the affected page and to indicate the correction on the copy. Mail this information to the CIMC, where it will be used to correct the publication before the materials are reprinted.

To ensure that the material is updated on a timely basis, notify the CIMC of necessary corrections as soon as possible after discovering the error. Do not assume that someone else will notice the error and inform the CIMC; other users may be making the same assumption. Please send corrections and recommendations for improving this publication to the following address:

Curriculum and Instructional Materials Center
Oklahoma Department of Vocational and
  Technical Education
1500 West Seventh Avenue
Stillwater, Oklahoma 74074-4364

BASIC SKILLS IN CURRICULUM

Since its inception in 1969, the Curriculum and Instructional Materials Center (CIMC) of the Oklahoma Department of Vocational and Technical Education has provided quality, competency-based instructional materials for vocational training programs. During this time, the CIMC has been mindful of the importance of reinforcement (and sometimes remediation) of students' academic skills as they progress through vocational training, and has always included activities in its materials to enhance and promote use of these skills.

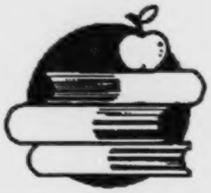
In response to changing job requirements, federal and state legislatures are enacting laws setting stringent basic skills requirements for nonvocational and vocational education. State legislatures are increasing basic skills accountability for teachers and school administrators. The recently enacted Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990 (P.L. 101-392) mandates academic skills development in vocational training. In addition, business and industry are delivering the message clearly to educators that vocational competence now requires increased strength in the basic skills.

As noted earlier, it is not new for CIMC materials to contain information and activities that develop basic skills competencies in students taking vocational training. What is new is the documentation or flagging of basic skills in CIMC materials, and further enhancement of basic skills activities. To accomplish this, the CIMC has developed a "Five Point Approach to the Integration of Basic Skills into the Curriculum." Following is a brief description of this process.

I. Basic Skills Icons

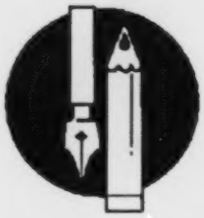
To assist teachers and students in identifying activities that promote basic skills development, the CIMC has implemented a marking system that uses simple graphic symbols, or icons, to denote which of nine general basic skill categories is being emphasized. These icons are located in the left margins of assignment, activity, and job sheets. The nine basic skill areas are as follows:

Reading Skills



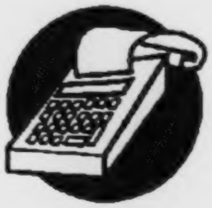
The activities identified by this icon deal specifically with developing reading skills in an applied, job-related context. These range from general information-gathering activities to tasks requiring use of specific technical reference materials.

Writing Skills

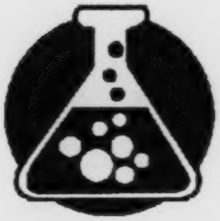


Tasks identified with this icon promote development of skills in written communication ranging in complexity from filling out forms to the written expression of ideas and concepts related to vocational exploration or performance.

Mathematics Skills



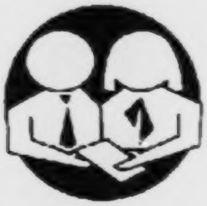
This icon identifies activities that develop vocationally related skills in computation; measurement and estimation; selection and application of appropriate mathematical process; and collecting, displaying, or interpreting data.



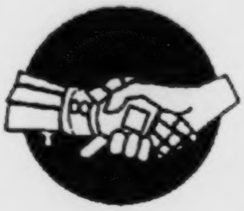
Science Skills

The science icon marks activities that are related to the development of skills in either the physical or biological sciences. These skills stress occupationally related applications of science and technology.

Oral Communication Skills



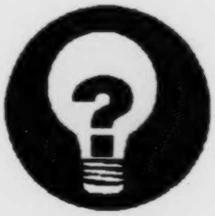
This icon identifies activities that promote development of effective speaking and listening skills. They include practice in such areas as speaking techniques, word choice, nonverbal messages, use of communication media, and using active listening techniques.



Interpersonal or Relating Skills

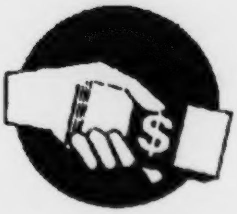
Activities that deal directly with skills in relating to others are marked with this icon. This includes areas such as group processes and dynamics, negotiation, dealing with conflict, and leadership/motivation.

Creative Thinking and Problem Solving Skills



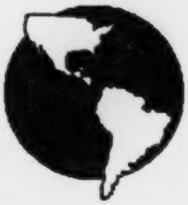
This icon identifies activities that stress development of higher-order thought processes such as problem identification and analysis, lateral thinking, evaluating alternatives/outcomes, and developing solutions.

Employability Skills



Activities marked with this icon relate to competencies required to obtain employment and develop a career. These competencies include specific occupational tasks and more general items such as career planning, job search, business etiquette, and maturing in one's work environment.

Social Studies Skills



This icon is used to identify activities that stress competencies in fields relating to human society and its distribution and relationships. This includes all the social sciences such as history, economics, geography, demographics, current events, cross-cultural studies, consumer issues, environmental issues, and ethical concerns in science and technology.

Some activities in the CIMC materials develop skills in more than one of the nine basic skill areas. In cases where the relative strengths of the skill elements are clearly discernable, the icon used is the one judged to be the primary, or the most heavily emphasized, activity. When there is no clear-cut difference between importance of skill area, multiple icons are used.

II. Enablers

Once the **general** basic skill activity has been identified by an icon, the CIMC takes the process one step further by indicating the **specific** skills that are addressed in an activity. This is accomplished by using enabling skills, or "enablers."

Lists of enablers, or specific skills required for each activity, have been developed at CIMC for each of the nine basic skills areas. The enablers have been grouped into sets of related skills under each icon. The list of general skill categories under each icon is as follows:

Reading Comprehension Skills
Research and Reference Skills
Functional Reading Skills

Language Skills
Composition Skills
Research Skills
Functional Writing Skills

Operation and Calculation Skills
Math Application Skills
Data Analysis and Display Skills
Functional Math Skills

General Science Skills
Life Science Skills
Physical Science Skills
Earth Science Skills

Oral Presentation Skills
Listening Skills
Interactive Communication Skills

General Relating Skills
Teamwork/Cooperative Skills
Leadership/Influencing Skills

Enablers
Cognitive Activities Skills

Job Search/Selection Skills
Job Acquisition/Development Skills

Information Analysis Skills
Social Studies Application Skills
Functional Social Studies Skills

Applicable enablers, grouped under their general categories, are listed beneath each icon in the left-hand margin of the activity, assignment, and job sheets. For example, an exercise that requires a student to conduct library research would make necessary the use of specific reading comprehension and research and references skills. The basic skills that the exercise is promoting would be depicted in the margin as follows:

Reading
Comprehension Skills
- Gain information

Research and
Reference Skills
- Select useful resources
- Find materials in library

[Text]

USING THE CIMC WRITTEN TESTS AS PRETEST AND POSTTEST TO MEASURE STUDENT PERFORMANCE GAINS

When you examine this book, you will notice that separate written pretests are no longer included in the units of instruction. Each CIMC unit now contains only a single written test. This test can be used as **both** pretest and posttest by giving it once before students start a unit and again when they have completed the unit.

DOCUMENTING STUDENT PERFORMANCE GAINS

The reason for using a single instrument as both pretest and posttest is so that direct comparison of each student's competencies before and after instruction can be made accurately. This comparison enables precise calculation, documentation, and evaluation of student **performance gains**.

Accurate performance gains analysis is an important requirement of the new Carl Perkins legislation for vocational education. Teachers can make an important contribution to the performance accountability mandated by the new federal legislation by carrying out accurate performance gains analysis for their students, and making this data available to students, parents, and administrators.

This analysis is easy to do and requires only simple calculations and record keeping. The new CIMC unit tests and the instructions given here for pretest/posttest analysis are designed to help teachers keep accurate performance gains data with minimum effort.

WHY SHOULD BOTH A PRETEST AND A POSTTEST BE USED, AND WHY SHOULD THEY BE THE SAME?

It is only possible to calculate a **gain** in performance if competencies are tested **both** before and after training. The use of a pretest and a posttest gives the required "before and after" information, allowing accurate comparison of student performance before and after completing a program of instruction.

Without pretest data, it is impossible to determine how well students could have met the objectives of a program without the benefit of any instruction. It would therefore be quite possible to incorrectly interpret good student performance on a posttest as gains in ability and knowledge produced by a good instructional program when, in fact, the posttest strength might be due merely to prior knowledge on the part of students. This erroneous conclusion is avoided by use of both pretest and posttest data.

If students cannot meet the objectives of a program prior to instruction but can meet them afterward, the conclusions that performance gain has been made, and made as a result of instruction, are much more likely to be accurate.

In order to provide data which can be precisely compared, the pretest and posttest **must be identical**. This is why CIMC materials have only one test for each unit. This test is intended to be used as both pretest and posttest.

After giving the written test to all students both before and after you present a unit, you will be ready to make the calculations needed for your analysis of your students' performance gains on the unit. There are two techniques you should use for this analysis.

ANALYZING PERFORMANCE GAINS FOR GROUPS OF STUDENTS

The first step to measuring student performance gains on a unit is to examine the gains made by an **entire class or other group**.

The simplest technique for showing posttest gains for a group is to calculate **pass rates** on the unit test. Pass rates are very easy to calculate, and require a minimum of computation.

Pass rates are simple percentages; specifically, the percentage of students who answered each test question correctly.

Matching Test Questions to Objectives

To determine pass rates, the first step is to match each question on the test to a specific objective. This is easy with CIMC instructional materials, because they have clearly specified objectives.

As an example of matching test questions to objectives, look at the chart below. Here, a teacher has decided that test questions 1 and 4 test objective number 1; question 3 tests objective number 2; and test question number 2 tests objective number 3.

OBJECTIVE NUMBER	TEST QUESTION NUMBER
1	1
1	4
2	3
3	2

Calculating Pass Rates

After you have carefully cross-matched test questions and objectives, you are ready to proceed with the calculation of pass rates. You will determine a pass rate for **each test question**. Calculate pass rates with this simple formula:

$$\frac{\text{Number of students who passed the question}}{\text{Number of students in group}} \times 100 = \textbf{Pass Rate} \text{ (\% of the group that passed the question)}$$

Keep in mind that pass rates examine the performance of a **group**. They do **not** provide information about individual students.

Using a Pass Rate Chart

The best way to record, display, and analyze pass rates is in a **Pass Rate Chart**. The chart puts all data in uniform and easily read format and simplifies data analysis. The chart should include pass rates for the group on both pretest and posttest for all test questions, and should indicate which specific questions relate to each objective. It should also show pass rates for the entire test as a whole.

Completing a Pass Rate Chart

Below is an example of a Pass Rate Chart.

PASS RATE CHART

OBJECTIVE NUMBER	TEST QUESTION NUMBER	PRETEST PASS RATE	POSTTEST PASS RATE
1	1	0%	100%
1	4	2%	82%
2	3	0%	60%
3	2	4%	92%
TOTAL TEST RATES		100-90% 0%	100-90% 60%
		89-80% 0%	89-80% 20%
		79 70% 0%	79-70% 10%
		69-60% 0%	69-60% 5%
		59-50% 0%	59-50% 5%
		49- 0% 99%	49-0% 0%

By looking at the figures on the chart, you can easily see how great a difference in performance there is for the class before and after instruction. You can also see which specific objectives and/or test questions caused problems for students. The differences between pretest and posttest pass rates represent performance gains for the group of students.

To complete a Pass Rate Chart, you need to go through a simple sequence of steps and record the information on the chart. A blank Pass Rate Chart is presented on page 11. You may duplicate this chart for your personal use.

To complete a Pass Rate Chart for a CIMC unit of instruction, go through the following steps:

1. Match the test questions on the written test to specific objectives, and fill in the first two columns on the left. These columns are labeled "Objective Number" and "Test Question Number." Some objectives may have more than one test question matched to them.

2. Give the CIMC written test as a pretest, then calculate the pass rate for each test question, using the formula given on page 4. Record the pass rate for each test question in the "Pretest Pass Rate" column.

EXAMPLE:

In a class of 26 students, 3 students got a question correct.
Pass rate for the question = (3 ÷ 26) X 100, or 11.5%.

3. Calculate the total test pass rates for the pretest and fill in these rates at the bottom of the "Pretest Pass Rate" column. Do this as follows:

   a. Calculate the percentage score made by each student on the pretest, using this formula:

$$\frac{\text{Number of points scored by student}}{\text{Number of points on the test}} \times 100 = \text{Percentage Score}$$

EXAMPLE:

A student earns 6 points out of a total of 75 possible on the test. The student's percentage score is (6 ÷ 75) X 100, or 8%.

b. Determine how many students earned percentage scores in each of the following score ranges:

100-90%
89-80%
79-70%
69-60%
59-50%
40-0%

c. Change the **number** of students in each score range into a **percent** of the total group, using the following formula:

$$\frac{\text{Number of students who scored in an interval}}{\text{Total number of students in group}} \quad \text{X } 100$$

EXAMPLE:

In a group of 32 students, 12 students scored in the interval of 59-50%. The percent of students who scored in this interval is (12 ÷ 32) X 100, or 37.5%.

4. Give the CIMC written test again as a posttest, then repeat steps 2 and 3 above. Fill in the appropriate figures in the "Posttest Pass Rate" column for each test question, and for the total test rates.

ANALYZING PERFORMANCE GAINS FOR INDIVIDUAL STUDENTS

After completing the Pass Rate Chart to analyze the performance gains for an **entire group** of students on a test, it is a good idea to calculate a measure of performance gains for **each individual** student. A simple and accurate way to do this is to calculate a **modified percentage gain score** for each student.

The modified percentage gain score for each student should be recorded in a **Modified Gain Record Chart**. This chart makes an easy reference for evaluating the gain performance of each student. A blank Modified Gain Record Chart appears on page 12. You may duplicate this chart for your personal use.

Calculating Modified Percentage Gain Scores

Modified percentage gain scores can be calculated at the top of each student's test paper. Calculate gain scores as follows:

1. Calculate the student's **Pretest Percentage**, or the percentage score the student made on the pretest. Use this formula:

$$\frac{\text{Number of points scored by student}}{\text{Number of points on the test}} \quad \text{X } 100$$

2. Subtract this percentage from 100%. The resulting figure is the **Percentage Available** to the student for improvement on the posttest.

3. Calculate the **Posttest Percentage**, or percentage score the student made on the posttest, using the formula given in step 1.

4. Subtract the **Pretest Percentage** from the **Posttest Percentage**. This figure is the **Percentage Gained** on the posttest.

5. Divide the **Percentage Gained** (step 4) by the **Percentage Available** for gain (step 2). This figure is the ***MODIFIED PERCENTAGE GAIN***. It shows what portion of the increase that was **possible** after the pretest was **actually gained** by the student on the posttest.

EXAMPLE:

As an example of the calculation of modified percentage gain scores, suppose a student made 10% on the pretest and 90% on the posttest. The calculation would be as follows:

1. The **Pretest Percentage** score of 10% was determined using the percentage formula given in step 1 on page 8.

2. **Percentage Available** to the student for improvement on the posttest:

100%	
- 10%	**(Pretest Percentage)**
90%	**(Percentage Available)**

3. The **Posttest Percentage** of 90% was determined using the percentage formula.

4. **Percentage Gained** on the posttest:

90%	**(Posttest Percentage)**
- 10%	**(Pretest Percentage)**
80%	**(Percentage Gained** on posttest)

5. The **MODIFIED PERCENTAGE GAIN** score:

80% **(Percentage Gained)** ÷ 90% **(Percentage Available)** X 100 = 89%

This student made a modified gain score of 89%. That means that the student earned 89% of the improvement that was possible for him/her on the posttest, based on his/her pretest score.

Using a Modified Gain Record Chart

A modified percentage gain score should be calculated for each student on each unit test. Enter the gain scores on a Modified Gains Record Chart like the one that is on page 12. (Copy this form for your own use.) By using these forms, you can easily check through the gain scores and analyze the performance gains made by your students on each unit of instruction.

If most students have made good performance gains from your instructional program, there will be a large number of high modified gain scores. This would indicate that your students are gaining from your program **most** of what they did not know before they received instruction.

****

You know how to verify gains in performance on CIMC unit tests, both for groups of students and for individual students. The procedures you have learned are based on:

- giving **pretests and posttests** which are identical
- calculating and analyzing **group pass rates** for learning objectives, for individual test questions, and for entire unit tests (Complete a Pass Rate Chart for each unit)
- calculating and analyzing **students' modified percentage gain scores** to determine their individual performance improvement (Complete a Modified Gain Record Chart for each unit)

By using these basic procedures you will gain accurate and objective information about what specific skills your students are mastering and how much they are improving as they proceed through your program. This information will be very valuable in documenting your students' achievement gains, and in increasing accountability to students, parents, administrators, and government.

PASS RATE CHART

CLASS ____________________

TEST/UNIT TITLE ____________________

TEST DATE ____________________

OBJECTIVE NUMBER	TEST QUESTION NUMBER	PRETEST PASS RATE	POSTTEST PASS RATE
TOTAL TEST PASS RATES		100-90% ___% 89-80% ___% 79-70% ___% 69-60% ___% 59-50% ___% 49-0% ___%	100-90% ___% 89-80% ___% 79-70% ___% 69-60% ___% 59-50% ___% 49-0% ___%

May be reproduced for teacher/evaluator use.

MODIFIED GAIN RECORD CHART

CLASS ______________________________

TEST/UNIT TITLE ______________________________

TEST DATE ______________________________

STUDENT'S NAME	PRETEST PERCENTAGE	POSTTEST PERCENTAGE	MODIFIED PERCENTAGE GAIN

May be reproduced for teacher/evaluator use.

OBJECTIVE SHEET

BASIC CONCEPTS OF PHYSICAL SCIENCE

I

INTRODUCTION

To adequately understand how the human body functions, you must understand the nature of matter and energy as well as the physical forces affecting the human body and its operations.

UNIT OBJECTIVE

After completing this unit, the student will be able to apply principles of basic physical science. The student will demonstrate this competency by completing the assignment sheet and the written test with 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with physical science to their definitions.
2. Distinguish among the states of matter.
3. Write the chemical symbols for common elements and compounds.
4. Distinguish between physical and chemical changes.
5. Select from a list forms of energy.
6. Distinguish among properties of acids and bases.
7. State the normal pH of gastric juice, urine, and blood.
8. Select from a list functions of electrolytes in the human body.
9. Classify the pH of solutions. (Assignment Sheet)

PREPARATION

- Order materials to supplement unit.

- Litmus paper may be ordered from a science supply catalog.

- Invite guest speakers.

  NOTE: Please provide the guest speakers with the specific topic relevant to the unit of instruction ahead of time. Confirm the scheduled appearance 2-3 days prior to the presentation.

- Obtain substances to use in assignment sheet.

- Make a poster pertaining to physical science.

- Make a bulletin board.

- Devise games and/or crossword puzzles to reinforce terms, grouping, etc.

- **HOSA** Integration

  - Assist students in conducting a chapter service project related to the unit information.

  - Develop objectives for the service project, identify a theme, and set a time line.

  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.

  - Arrange for photographs of all public speaking, presentations, or other public contact.

  - Host terminology and spelling contests.

  - Assist students in scheduling and presenting prepared and extemporaneous speeches.

  - Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.

  - Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.

- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

- Discuss unit goal.

Objective 1: Match terms associated with physical science to their definitions.

- Discuss terms associated with physical science.
- Have students play reinforcement games and work crossword puzzles using terms.

Objective 2: Distinguish among the states of matter.

- Discuss states of matter.
- Provide common, everyday items as examples of states of matter.
- Display Transparency Master 2.

Objective 3: Write the chemical symbols for common elements and compounds.

- Discuss chemical symbols.
- Display pictures or models which show chemical symbols.

Objective 4: Distinguish between physical and chemical changes.

- Discuss physical and chemical changes.
- Provide examples and demonstrate changes.

  EXAMPLE: Pouring vinegar into fresh milk, striking a wooden match, or mixing vinegar and baking soda in a bottle with a balloon on top.

Objective 5: Select from a list forms of energy.

- Discuss and demonstrate the forms of energy.

  EXAMPLE: Rub a balloon across a surface (electrical), five minutes of aerobics (heat, mechanical, and radiant). Ask a science teacher for more examples.

- Use Transparency Master 1.

Objective 6: Distinguish among properties of acids and bases.

Objective 7: State the normal pH of gastric juice, urine, and blood.

- Discuss properties of acids and bases.
- Have students smell, feel, and taste products such as vinegar, tomato juice, baking soda and predict whether they are acid or alkaline.

  NOTE: Students should not ingest products, but should put a small amount on a finger and taste, smell, and feel.
- Discuss normal concentrations of acids and bases.
- Use Transparency Master 2.
- Have students complete assignment sheet.

Objective 8: Select from a list functions of electrolytes in the human body.

- Discuss the function of electrolytes in the body.

Objective 9: Classify the pH of solutions.

- Discuss the assignment sheet. Demonstrate and discuss the use of litmus paper. Have students complete the exercises.
- Compare laundry detergents with and without built-in bleach or whitener.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.
- Evaluate students on the assignment sheet activities if not previously completed.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Acid/Base Balance: Ups & Downs of pH.* Produced by Golden West College. Available through Concept Media, P.O. box 19542, Irvine, CA 92713, 1-800-233-7078, VHS.
- *Introducing Biology*, a telecourse. The Coast Community Colleges and KOCE-TV, Coastline Community College, Orange County, CA.
- *The Cell: A Functioning Structure, Part I.* CRM, McGraw-Hill Films, Del Mar, CA 92014. (30 minutes, color and sound)

Print Media

- Anthony, Catherine, P. and Gary A. Thibodeau. *Textbook of Anatomy and Physiology.* 11th ed. St. Louis: C.V. Mosby Co., 1983.
- Hole, John W. Jr. *Human Anatomy and Physiology.* 7th ed., Dubuque, Iowa: Wm. C. Brown Co. Publishers, 1987.
- *Thin Man Chart.* Health Edco, P.O. Box 21207, Waco, Texas 76702-9964, 1-800-299-3366. (anatomical chart on 63" stand)

Software

- *Crossword Magic.* L & S. Computerware, Mindscape, Inc., 3444 Dundee Road, North Brook, Illinois.
- *The Human Body: An Overview.* Opportunities for Learning, Inc., 941 Hickory Lane, P.O. Box 8103, Mansfield, Ohio, 44901-8103, 1-800-243-7116. A computer program including review questions and accurate graphics representing all body systems. For use on Apple computers.

UNIT REFERENCES

- Anthony, Catherine, P. and Gary A. Thibodeau. *Textbook of Anatomy and Physiology.* 11th ed., C.V. Mosby Co., St. Louis 1983.
- Hole, John W. Jr. *Human Anatomy and Physiology.* 7th ed., Dubuque, Wm. C. Brown Co. Publishers, Iowa 1987.
- Marieb, Elaine N. *Essentials of Human Anatomy and Physiology.* 3rd ed., The Benjamin/Cummings Publishing Co., Inc., Redwood City, California, 1991.
- Soloman, Eldra Pearl and Gloria A. Phillips, *Understanding Human Anatomy and Physiology*, W.B. Saunders, Co., Philadelphia, 1987.
- Tortora, Gerard J., *Principles of Human Anatomy*, 4th ed., Harper and Row, New York, 1986.

INFORMATION SHEET

BASIC CONCEPTS OF PHYSICAL SCIENCE

I

OBJECTIVE 1

Match terms associated with physical science to their definitions.

- **acid** – substance that gives up hydrogen ions in solutions
- **acidosis** – condition resulting from accumulation of acid or depletion of the alkaline reserves in the blood and body tissue
- **alkalosis** – condition resulting from accumulation of base or depletion of acid reserves in the blood and body tissue
- **base** – substance that yields hydroxyl ions in solution

  NOTE: The terms "base" and "alkaline" are used interchangeably.
- **chemical change** – change that affects the composition of matter
- **compound** – two or more elements united in a fixed ratio
- **electrolyte** – any compound that separates into charged particles, called ions, which are capable of conducting an electrical current when dissolved in water
- **element** – simple, pure substance that cannot be broken down by ordinary chemical reactions
- **energy** – force that produces change or results from change; the ability or power to do work
- **ion** – atom or group of atoms carrying an electrical charge
- **matter** – physical material having form and weight; anything that occupies space and has weight
- **mineral salts** – compounds formed from the reaction of an acid with a base
- **mixture** – two or more elements or compounds that are not chemically combined
- **pH** – hydrogen ion concentration of a solution; degree to which a solution is acidic or alkaline
- **physical change** – change that does not affect the chemical composition of matter

- **physics** – science that deals with matter, energy, and their interactions
- **plasma** – liquid part of blood
- **solution** – liquid containing dissolved solids called *solutes*

OBJECTIVE 2 Distinguish among the states of matter.

There are three states of matter:

- **solid** – a definite shape, volume, and weight

  EXAMPLES: Bones, tissues, and rocks

- **liquid** – a definite volume and weight but assumes the shape of the container in which it is placed

  EXAMPLES: Water, plasma, and tissue fluids

- **gas** – a definite weight but indefinite shape and volume

  EXAMPLES: Oxygen and carbon dioxide in the lungs

OBJECTIVE 3 Write the chemical symbols for common elements and compounds.

The Tables below show the chemical symbols for common elements and compounds found in living organisms.

ELEMENT	SYMBOL
Carbon	C
Chlorine	Cl
Hydrogen	H
Iodine	I
Iron	Fe
Nitrogen	N
Oxygen	O
Phosphorus	P
Potassium	K
Sodium	Na
Calcium	Ca
Magnesium	Ma

COMPOUND	SYMBOL
Carbon Dioxide	CO_2
Hydrochloric Acid	HCl
Hydrogen Peroxide	H_2O_2
Sodium Chloride	NaCl
Water	H_2O

OBJECTIVE 4 **Distinguish between physical and chemical changes.**

A chemical change is a change in the molecular structure of a substance. A chemical change:

- Produces a new substance
- Is irreversible or reversible only with difficulty

Chemical changes are:

- Rusting iron
- Souring milk
- Burning wood
- Digesting food

A physical change does not involve a change in the molecular structure of substances. A physical change:

- Produces no new substance
- Is easily reversible

Physical changes are:

- Heating an iron
- Freezing water
- Heating water to steam

OBJECTIVE 5 **Select from a list forms of energy.**

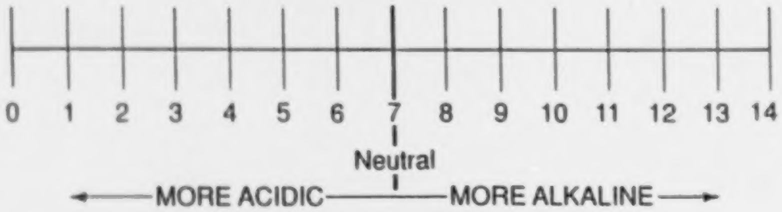
Energy can be defined as the ability to do work. Forms of energy include:

- Heat
- Mechanical
- Radiant
- Electrical
- Chemical
- Nuclear

OBJECTIVE 6 **Distinguish among properties of acids and bases.**

An acid is a substance which when placed in water results in the liberation of hydrogen ions or charged hydrogen atoms

pH Scale



Excessive concentrations of acids in the body may cause acidosis.

Some of the properties of acids are:

- Sour taste
- Pungent odor
- pH below 7

EXAMPLES: Hydrochloric acid, citric acid, and sulfuric acid

Bases, or alkalies, are substances which, when placed in water, result in the release of excess hydroxyl ions.

Excessive concentrations of bases in the body may cause alkalosis.

Some of the characteristics of alkalies or bases are:

- Bitter taste
- Soapy or slippery feeling
- pH above 7

EXAMPLES: Sodium hydroxide, lye, and potassium hydroxide

Some of the common properties of acids and bases include:

- React with each other to produce a salt and water. Salts and water are essential to the maintenance of a normal acid-base balance of the body.
- Cause certain dyes to undergo color change

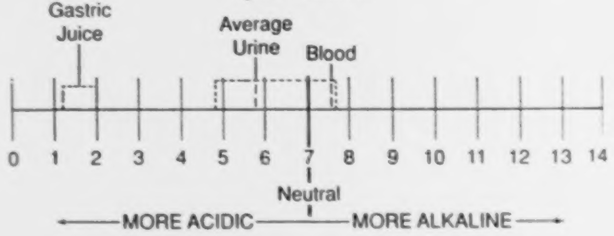
OBJECTIVE 7

State the normal pH of gastric juice, urine, and blood.

It is important for normal functioning that the body maintain the proper acid-base balance. There are a number of mechanisms that operate to maintain this balance–the respiratory system and kidney functions are two of them. To become aware of pH problems, it is necessary to recognize the normal values of some body fluids. Among those fluids are:

- Gastric juice – pH 1.2—2 (very acidic)
- Blood – pH 7.45 (slightly alkaline). Differences exist in venous and arterial blood.
- Urine – normal range of urine pH is 4.8 (acidic) to 7.5 (slightly alkaline). It generally averages about 6; rarely becomes more acidic than 4.5 or more alkaline than 8.

pH Scale



OBJECTIVE 8

Select from a list functions of electrolytes in the human body.

Body fluids contain needed electrolytes or mineral salts that break into ionized particles to be used in various body functions. These electrolytes have either a positive or a negative charge.

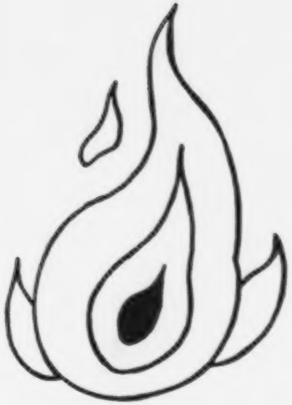
Electrolytes in the body:

- Build and maintain skeletal tissue
- Help maintain acid-base balance
- Help maintain fluid balance

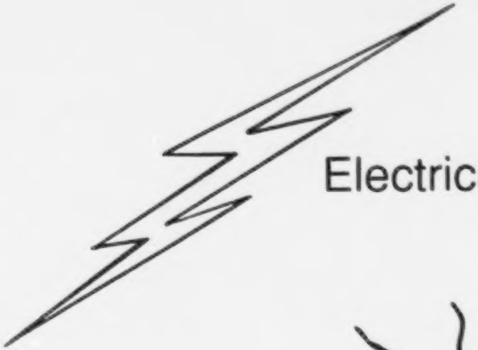
COMMON ELECTROLYTES

Positively Charged Ions		Negatively Charged Ions	
Calcium	Ca +	Bicarbonate	HCO_3-
Magnesium	Mg+	Chloride	Cl-
Potassium	K+	Phosphate	PO_4-
Sodium	Na+	Sulfate	SO_4-

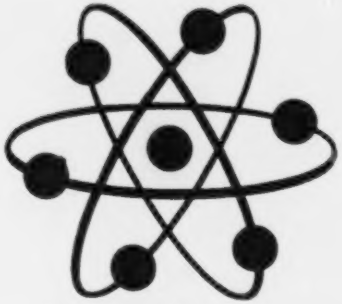
Forms of Energy



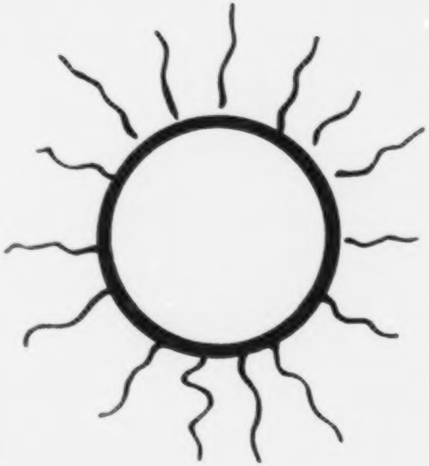
Heat



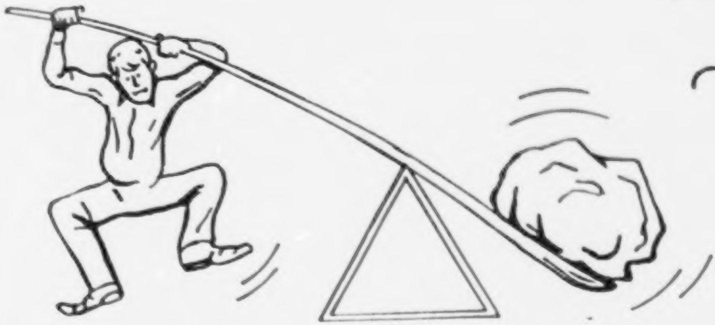
Electrical



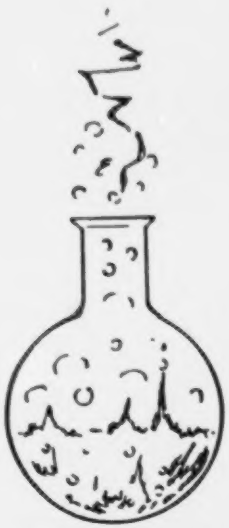
Nuclear



Radiant



Mechanical

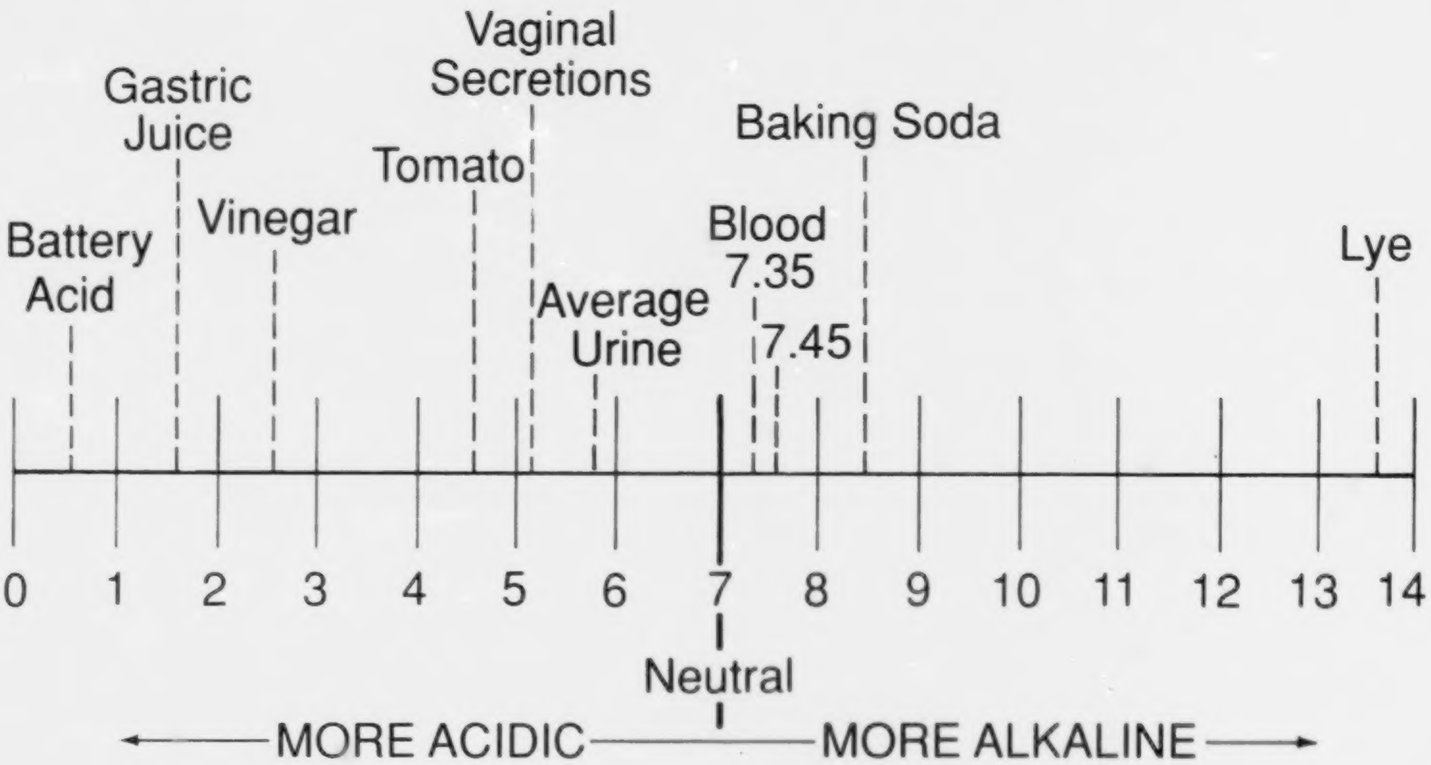


Chemical

TRANSPARENCY MASTER 1 · Body Structure and Function
CIMC · I · 13

TM 1

pH Scale


Vaginal Secretions
Gastric Juice
Baking Soda
Tomato
Vinegar
Battery Acid
Blood
7.35
7.45
Lye
Average Urine
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Neutral
MORE ACIDIC
MORE ALKALINE

ASSIGNMENT SHEET

Development of:
MATH SKILLS
SCIENCE SKILLS

- Introduce the assignment to the students by discussing why the math and science skills are important.

- Discuss with students the following skills which are relevant to this task.

  MATH SKILLS

  - Collect/record data
  - Make measurements

  SCIENCE SKILLS

  - Conduct experiments
  - Analyze/classify matter
  - Use scientific instruments (litmus paper)

- If students have difficulty collecting and/or recording data, suggest that they first decide how the data will be collected and recorded. Explain that it is always best to come prepared with pencil or pen and a preplanned sheet for recording the specific data that will be collected. This preparation allows the person collecting and recording the data to devote careful attention to their work.

- If students have difficulty making measurements:

  - Remind the students that the first trick to making accurate measurements is to understand the techniques used for the type of measurement being made.
  - Suggest that the students ask questions such as how should the measurement be recorded (nearest inch), what should I use to make the measurement, or are there any special instructions I should follow. Thoroughly understanding what is expected and what needs to be learned makes the measuring task easier.

- If students have difficulty conducting experiments:
  - Remind them to read or listen carefully to all the instructions as they are presented before trying to start the experiment. If the instructions are given orally, suggest that they take notes so that an important step won't be forgotten.
  - Discuss with the students the importance of asking questions about anything they don't understand before beginning the experiment.
  - Discuss with them why it is critical to the success of an experiment that the directions be followed exactly. Explain that sometimes one small mistake can have disastrous results.
  - Provide opportunities for the students to read or listen to directions for conducting simple experiments. Ask a volunteer to explain how to complete each experiment. Have the other students discuss whether the experiment directions were stated correctly.
- If students have difficulty using litmus paper, discuss, demonstrate, and review the procedures again. Provide additional opportunities for the students to practice using litmus paper.
- If students have difficulty analyzing/classifying matter:
  - Remind them that before classifying items or materials, they must identify the characteristic or characteristics used for classifying or grouping. Provide opportunities for them to analyze and classify a group of objects. For example, have students classify the class into two groups–those who are wearing red and those who are not wearing red. Have students suggest other classification categories.

ASSIGNMENT SHEET

BASIC CONCEPTS OF PHYSICAL SCIENCE

I

Name ______________________ Score __________

OBJECTIVE 9

Data Analysis and Display Skills
- Collect/record data

Functional Math Skills
- Make measurements

General Science Skills
- Conduct experiments
- Use scientific instruments
- Analyze/classify matter

Classify the pH of solutions.

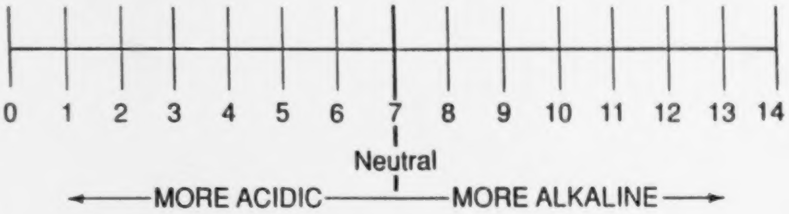
Knowledge of acidic and alkaline substances is very important in the health field. To remain healthy, people must maintain a normal balance of acids and bases in their bodies.

Using the litmus paper and instructions given by the instructor, test different solutions to find their pH.

Classify the pH of solutions using the scale provided. Circle **acid** if the solution is acidic and **alkaline** if the solution is alkaline. Write the pH value on the line.

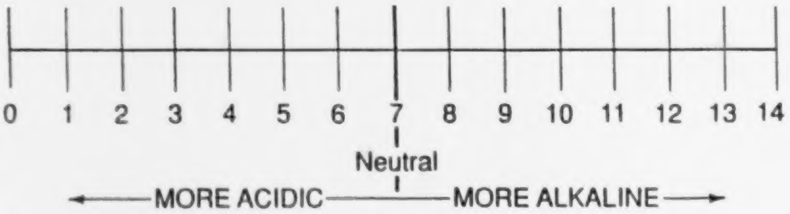
SOLUTION

1. tomato juice


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Neutral
MORE ACIDIC
MORE ALKALINE

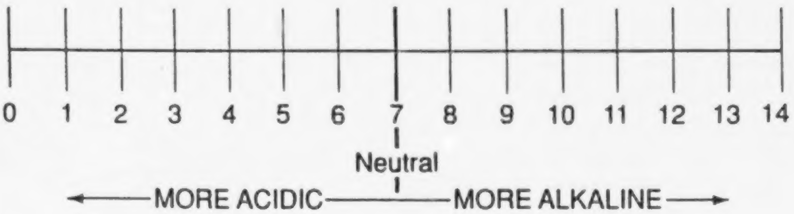
Acidic Alkaline
pH _______

2. vinegar


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Neutral
MORE ACIDIC
MORE ALKALINE

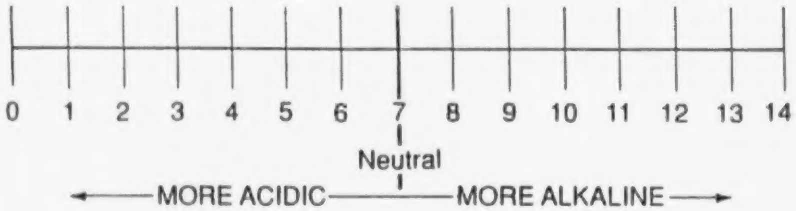
Acidic Alkaline
pH _______

3. powdered, no-bleach laundry detergent


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Neutral
MORE ACIDIC
MORE ALKALINE

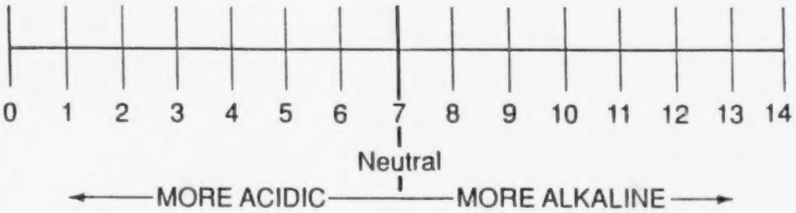
Acidic Alkaline
pH _______

4. cola


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Neutral
MORE ACIDIC
MORE ALKALINE

Acidic Alkaline
pH _______

5. baking soda


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Neutral
MORE ACIDIC
MORE ALKALINE

Acidic Alkaline
pH _______

ASSIGNMENT SHEET

pH values will vary.

1. Acid pH _______
2. Acid pH _______
3. Alkaline pH _______
4. Acid pH _______
5. Alkaline pH _______

WRITTEN TEST

BASIC CONCEPTS OF PHYSICAL SCIENCE

I

OBJECTIVE 1

Match terms associated with physical science to their definitions. Write the correct letters in the blanks.

Part I

_____ 1. Physical material having form and weight; anything that occupies space and has weight

_____ 2. Two or more elements or compounds that are not chemically combined

_____ 3. Change that does not affect the chemical composition of matter

_____ 4. Science that deals with matter, energy, and their interactions

_____ 5. Simple, pure substance that cannot be broken down by ordinary chemical reactions

_____ 6. Substance that yields hydroxyl ions in solution

_____ 7. Substance that gives up hydrogen ions in solution

_____ 8. Hydrogen ion concentration of a solution; degree to which a solution is acidic or alkaline

_____ 9. Condition resulting from accumulation of acid or depletion of the alkaline reserves in the blood and body tissues

_____ 10. Condition resulting from accumulation of base or depletion of acid reserves in the blood and body tissues

a. acid

b. acidosis

c. alkalosis

d. base

e. chemical change

f. compound

g. element

h. energy

i. matter

j. mixture

k. pH

l. physical change

m. physics

n. plasma

o. solution

May be photocopied for student use.

Part II

_____ 1. Any compound that separates into charged particles called ions, which are capable of conducting an electrical current when dissolved in water

_____ 2. Liquid containing dissolved solids called *solutes*

_____ 3. Compounds formed from the reaction of an acid with a base

_____ 4. Change that affects the composition of matter

_____ 5. Force that produces change or results from change; the ability or power to do work

_____ 6. Atom or group of atoms carrying an electrical charge

_____ 7. Liquid part of blood

_____ 8. Two or more elements united in a fixed ratio

a. acid
b. chemical change
c. compound
d. electrolyte
e. element
f. energy
g. ion
h. mineral salt
i. mixture
j. physical change
k. plasma
l. solution

OBJECTIVE 2

Distinguish among the states of matter. Write the correct letter in the blank.

_____ 1. A definite weight with indefinite shape and volume is a

a. solid

b. liquid

c. gas

d. all of the above

May be photocopied for student use.

_____ 2. A definite volume and weight which assumes the shape of the container in which it is placed is a

a. solid

b. liquid

c. gas

d. all of the above

_____ 3. A definite shape, volume, and weight is a

a. solid

b. liquid

c. gas

d. all of the above

OBJECTIVE 3 **Write the chemical symbols for common elements and compounds.** Write the symbols in the blanks.

1. The chemical symbol for hydrogen is _______.
2. The chemical representation for carbon dioxide is _______.
3. The chemical symbol for potassium is _______.
4. The chemical symbol for carbon is ________.
5. The chemical symbol for sodium chloride is _______.
6. The chemical symbol for water is _______.
7. The chemical symbol for chlorine is _______.
8. The chemical symbol for iodine is _______.
9. The chemical symbol for hydrochloric acid is _______.
10. The chemical symbol for iron is _______.
11. The chemical symbol for nitrogen is _______.
12. The chemical symbol for sodium is _______.

May be photocopied for student use.

13. The chemical symbol for hydrogen peroxide is _______.

14. The chemical symbol for oxygen is _______.

15. The chemical symbol for magnesium is _______.

16. The chemical symbol for phosphorus is _______.

17. The chemical symbol for calcium is _______.

OBJECTIVE 4 **Distinguish between physical and chemical changes.** Write the correct letter in the blank.

_____ 1. Rusting of iron is a

a. physical change

b. chemical change

_____ 2. Freezing of water is a

a. physical change

b. chemical change

_____ 3. A chemical change

a. produces no new substance

b. produces a new substance

c. is easily reversible

d. is totally irreversible

_____ 4. A physical change

a. produces no new substance

b. produces a new substance

c. is irreversible or reversible only with difficulty

d. is totally irreversible

May be photocopied for student use.

_____ 5. Heating an iron is a

a. physical change

b. chemical change

c. it is not an example of either a physical or chemical change

d. can be both a and b

OBJECTIVE 5 **Select from a list forms of energy.** Write an "X" in the blank before each form of energy.

_____ 1. Heat

_____ 2. Sound waves

_____ 3. Light

_____ 4. Water

_____ 5. Mechanical

_____ 6. Radiant

_____ 7. Chemical

_____ 8. Automatic

_____ 9. Electrical

_____ 10. Reflective

_____ 11. Nuclear

_____ 12. Aerobic

OBJECTIVE 6 **Distinguish among properties of acids and bases.** Write an "A" in the blank before each property of acids, a "B" before each property of bases, and an "A&B" before each property of both.

_____ 1. pH below 7

_____ 2. Soapy or slippery feeling

_____ 3. Sour taste

May be photocopied for student use.

_____ 4. pH above 7

_____ 5. React with each other to produce a salt and water

_____ 6. Pungent odor

_____ 7. Bitter taste

_____ 8. Cause certain dyes to undergo color change

OBJECTIVE 7 **State the normal pH of gastric juice, urine, and blood.** Write the answer in the blank.

1. The normal pH of gastric juice is _______.
2. The normal pH of urine is _______.
3. The normal pH of blood is _______.

OBJECTIVE 8 **Select from a list functions of electrolytes in the human body.** Write an "X" in the blank for each correct answer.

_____ 1. Helps lower cholesterol

_____ 2. Helps maintain acid-base balance

_____ 3. Increases appetite

_____ 4. Helps maintain fluid balance

_____ 5. Helps lower blood pressure

_____ 6. Builds and maintains skeletal tissue

NOTE: Objective 9 is evaluated on the job sheet/assignment sheet in this unit. If you have not completed this component, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

BASIC CONCEPTS OF PHYSICAL SCIENCE

I

OBJECTIVE 1

	Part I	Part II
1.	i	d
2.	j	l
3.	l	h
4.	m	b
5.	g	f
6.	d	g
7.	a	k
8.	k	c
9.	b	
10.	c	

OBJECTIVE 2

1. c
2. b
3. a

OBJECTIVE 3

1. H
2. CO_2
3. K
4. C
5. NaCl
6. H_2O
7. Cl
8. I
9. HCl
10. Fe
11. N
12. Na
13. H_2O_2
14. O
15. Mg
16. P
17. Ca

OBJECTIVE 4

1. b
2. a
3. b
4. a
5. a

OBJECTIVE 5

1, 5, 6, 7, 9, 11

OBJECTIVE 6

1. A
2. B
3. A
4. B
5. A&B
6. A
7. B
8. A&B

OBJECTIVE 7

1. 1.2—2
2. 4.8—7.5
3. 7.45

OBJECTIVE 8

2, 4, 6

OBJECTIVE SHEET

BASIC CONCEPTS OF LIFE SCIENCE

II

INTRODUCTION

We are made of chemicals and minerals such as iron, calcium, carbon, hydrogen, and oxygen; so are many other things. What makes us live while other things, made of the same elements, remain inanimate? What is "life?"

We live because we are composed of living cells. These cells have all the abilities we attribute to life: they eat, they expel waste, they reproduce. All living things are composed of these cells.

Cells are organized to complete specialized tasks. For example, nerve cells transmit messages, or nerve impulses, through long "fingers" to other nerve cells. White blood cells identify and combat invading organisms. Sperm and egg cells unite during the reproductive process. Each cell contains basic structures that protect the cell, guide its function, and pass on the genetic details of the organism.

Cells' functions, the tissues they form, and the most basic anatomical divisions must be understood before any study of body structure and function can be successful.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify the components and functions of cells, the stages of mitosis, and the types of solutions, tissues and membranes. The student will also be able to identify and use anatomical directions and quadrants. The student will demonstrate these competencies by completing assignment sheets and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with life science to their definitions.
2. Choose the word or phrase that completes statements about homeostasis.
3. Label basic parts of the cell.
4. Match characteristics of a cell to their definitions.
5. List functions of some of the components of a cell.
6. Match basic cell components to their definitions.

7. Select from a list major functions of enzymes.
8. Choose the word or phrase that completes statements about mitotic cell division.
9. Distinguish between active and passive transport.
10. Match types of passive transport movement to their definitions.
11. Match types of active transport movement to their definitions.
12. Match types of solutions to their definitions.
13. Match types of tissues to their functions.
14. Match types of tissue membranes to their definitions.
15. Define correct anatomical position.
16. Match anatomical points of reference to their definitions.
17. Match directional terms to their definitions.
18. Label body cavities.
19. Label quadrants of the abdominopelvic cavity.
20. Label abdominopelvic regions of the body.
21. Match anatomical planes to their definitions.
22. Label anatomical planes.
23. Demonstrate the transport of materials. (Assignment Sheet 1)
24. Use directional terms. (Assignment Sheet 2)

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Order materials to supplement the unit.
- Invite a guest speaker, such as a lab technician, genetics specialist, or physician.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. Confirm the scheduled appearance 2-3 days prior to the presentation.
- If possible, plan a field trip to an anatomy lab at a medical school. Contact the school as soon as possible to identify the best time for the trip.
- Obtain models and large pictures of cells, tissues and anatomical regions.
- Devise games and/or crossword puzzles to reinforce terms, groupings, etc.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.

- Arrange for photographs of all public speaking, presentations, or other public contact.
- Host terminology and spelling contests.
- Assist students in scheduling and presenting prepared and extemporaneous speeches.
- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with life science to their definitions.

- These objectives will include many new terms. Since the unit includes a relatively long vocabulary list and other new terms, give students memory devices to make learning them easier. Relate words to systems whenever possible.
- Use Transparency Master 1 to introduce the unit.
- Discuss terms associated with life science.
- Have students guess what vocabulary words mean before giving them the correct definitions. Allow silly definitions. "Mitosis," for example, could be defined as the disease a two-year-old gets when everything he sees belongs to him and nobody else can touch it. Later, these definitions can be used as mnemonic devises to improve student performance.
- Have students play reinforcement games and work crossword puzzles using terms.

  NOTE: Computer software which develops crossword puzzles is available to Oklahoma instructors from the Oklahoma Department of Vocational and Technical Education. See the Resource section for specific ordering instructions.

Objective 2: Choose the word or phrase that completes statements about homeostasis.

- Discuss the concept of homeostasis. Compare it to other things students have to balance to give them a visual prompt.

- Discuss the functions of each of the components. Tell students more details will be discussed when the nervous system is covered. Compare components to parts of a computer.

- Discuss positive and negative feedback. Discuss the fight-or-flight response and have students identify positive feedback, such as increased adrenaline production and negative feedback, such as decreased digestion.

Objective 3: Label basic parts of the cell.

Objective 4: Match characteristics of a cell to their definitions.

Objective 5: List functions of some of the components of the cell.

- Discuss functions of principle compounds found in protoplasm.

- Discuss characteristics of protoplasm.

- Challenge students to identify a living thing that does not exhibit the characteristics of protoplasm.

- Have students list all the ways they exhibit each characteristic of protoplasm.

- Discuss metabolic reactions in the body.

- Give the students memory clues. For example, "catabolism" sounds similar to "cannibalism." Tell students to picture a group of cannibals being reduced to a smaller, simpler group (probably getting smaller right after supper).

- Most students will connect metabolism and weight loss. Explain metabolism. Discuss diets that claim to work by manipulating metabolism and explain why they do or do not work.

- Use Transparency Master 2 to identify cell components.

Objective 6: Match basic cell components to their definitions.

- Some discussion of DNA, RNA and related topics may be necessary.

- Have students examine slides of cells, tissues, and membranes using a microscope. Show students how to get a cell sample.

Objective 7: Select from a list major functions of enzymes.

- Discuss the functions of enzymes.

- Have students identify uses of enzymes. These could be realistic (to break down food) or fantastic (to identify and destroy that stale foot odor in my son's bedroom).

- Explain to students that enzyme action will be important in later units.

Objective 8: Choose the word or phrase that completes statements about mitotic cell division.

- Explain the steps in mitosis.

- Use a ball of clay to demonstrate mitosis. By using two colors, one for the nucleus and one for the outer layers, a good reproduction can be presented.

- Discuss mitosis and cancer. Present slides or photographs showing the rapid cell growth.

- Use Transparency Master 3 to illustrate the steps in mitosis.

Objective 9: Distinguish between active and passive transport.

Objective 10: Match types of passive transport movement to their definitions.

Objective 11: Match types of active transport movement to their definitions.

- Relate types of movement to their uses.

- Have students compare types of cell movement to common items: filtration to their air conditioning filter; diffusion to 5:00 traffic; phagocytosis to eating finger food.

- Gives examples of each type of movement in the human body.

- Use Transparency Master 4 to illustrate objective information.

- Have students complete Assignment Sheet 1.

Objective 12: Match types of solutions to their definitions.

- Discuss the three types of solutions.

- Use Transparency Master 5 to illustrate types of solutions.

- Use a balloon to demonstrate the types of solutions. Blow up the balloon and explain that if it were a cell and the concentration inside and outside the cell were the same, the cell would remain as it is. If the concentration outside the cell increased, the cell would crenate. At the same time, let the air out of the balloon. Then explain that if the reverse occurred, and the concentration outside the balloon was less than the concentration inside, the cell would rupture and blow the balloon until it pops.

Objective 13: Match types of tissues to their functions.

- List some basic body tissues and ask students to brainstorm on the purposes of each and the general purposes of tissues. See how close they come to the four basic types.
- Give examples of each type of tissue. Students may not be familiar with the functions of some tissues, so be sure the connection and explanation are clear.
- Use Transparency Masters 6 and 7 to illustrate tissue types.

Objective 14: Match types of tissue membranes to their descriptions.

- Present illustrations showing different types of membranes.
- Have students discuss why each type of membrane has its own special needs and functions.

Objective 15: Define correct anatomical position.

- Use Transparency Master 8 to illustrate the anatomical position.
- Have students survey texts and references and identify drawings in and out of the anatomical position.
- Illustrate the importance of a standard position for labeling and identifying locations by having students sketch people in various poses. The first student should be in the anatomical position. Later poses should include drawing a person pointing at the student and a person running toward a student.
- Have students complete the Activity Sheet.

Objective 16: Match anatomical points of reference to their definitions.

Objective 17: Match directional terms to their definitions.

- Describe the basic functions of each area and discuss how they relate to the divisions. Illustrate, for example, that the body can't be divided at the waist because the functions of the chest and abdomen are too dependent on one another.

- Bring a doll. Show that even dolls are broken along the same lines. Have students identify each part of the doll using the directional terms and anatomical points of reference.

- Explain that the same divisions and directional terms are used for all mammals. Have them identify points on dogs, horses, etc.

- Label parts of the classroom using directional terms.

- Use Transparency Masters 9 and 10.

- Have students complete Assignment Sheet 2.

Objective 18: Label body cavities.

- The term "cavity" probably means tooth decay to your students. Define cavity and relate it to "cave."

- Have students name bodily cavities. Although this unit concentrates on the major cavities, allow students to include minor cavities such as the mouth. Some students may be embarrassed to discuss the vagina or other body parts. Use this exercise to help desensitize them.

- List organs found in each cavity. Discuss how they are related.

- Discuss how the contents of each cavity are protected.

- Use Transparency Master 11 to illustrate cavities.

Objective 19: Label quadrants of the abdominopelvic cavity.

Objective 20: Label abdominopelvic regions of the body.

- Identify the contents of each quadrant and region of the abdominopelvic cavity.

- Allow students to put together a three-dimensional model of the abdominopelvic cavity.

- Explain the meanings of the regional names.

- Use Transparency Masters 12 and 13 to illustrate objective information.

Objective 21: Match anatomical planes to their definitions.

Objective 22: Label anatomical planes.

- Have students divide a variety of drawings along the anatomical planes and list organs that are divided.

- Use Transparency Master 14 to illustrate planes.
- Have students use directional terms to identify each area separated by the anatomical planes.
- Have a student serve as a model. Have other students mark the anatomical planes on the model with masking tape.

APPLICATION

Objective 23: Demonstrate the transport of materials.

- Have students complete Assignment Sheet 1 to demonstrate the transport of materials.
- Invite a chemist to present a demonstration of the three types of solutions. He or she will be able to provide clear, interesting displays.
- Obtain membranes from a chicken breast or egg or contact a veterinarian.

Objective 24: Use directional terms.

- Have students complete Assignment Sheet 2 to use directional terms.
- Encourage students to use directional terms throughout this unit.
- Have students describe everyday items using directional terms. The front door becomes the anterior door, for example.
- Have students describe a painting or their route home using directional terms.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.
- Evaluate students on assignment sheet activities, if not previously completed.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to revaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *The Cell: A Functioning Structure, Part I.* CRM, McGraw-Hill Films, Del Mar, CA 92014. (30 minutes, color and sound)

- *Introducing Biology*, a telecourse. The Coast Community Colleges and KOCE-TV, Coastline Community College, Orange County, CA.

- *Opportunities for Learning, Inc.*, 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700. The following materials are available:

  Human Systems Filmstrip Sets: Cells, Tissues, and Membranes. Includes filmstrip, cassette, and student self-instruction script booklet. Covers basic material; mitosis.

  Filmstrip Set: Introduction to Medical Terminology. Two filmstrips with cassettes and fact sheets. Covers prefixes, suffixes, roots, anatomical position, planes and systems, and directions.

Print Media

- Lindner, Harold H. *Clinical Anatomy.* The Nurse's Book Society: Delran, N. J. 08370.

Software

- *The Human Body: An Overview.* Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700. Computer software including graphics, multiple choice, true-false, and short answer questions. Comes with teacher's guide. For use on an Apple computer, 48K.

UNIT REFERENCES

- Anthony, Catherine P. and Gary A. Thibodeau. *Textbook of Anatomy and Physiology*, 11th ed. The C.V. Mosby Co.: St. Louis, 1983.

- Hole, John W. Jr. *Human Anatomy and Physiology*, 7th ed. Wm. C. Brown Co. Publishers: Dubuque, Iowa, 1987.

- Tortora, Gerald J. and Nicholas Anagnostakos. *Principles of Anatomy and Physiology*, 3rd ed. Harper & Row: New York, 1981.

OBJECTIVE 1

Match terms associated with life science to their definitions.

- **anatomy** — the study of the construction of the human body
- **cavity** — a hollow space
- **cell** — the simplest form of living matter that is capable of maintaining life and reproducing itself
- **chemistry** — the study of the composition of substances and the changes they undergo
- **concentration** — relative content or strength of an ingredient
- **cytology** — the study of the structure, function, and reproduction of cells
- **distribution** — position, arrangement, or frequency of occurrence
- **electrolyte** — substances that conduct an electrical current when in solution
- **ion** — an atom or a group of atoms carrying an electrical charge
- **microbiology** — the study of living organisms
- **semipermeable** — will allow fluids, but not solid particles, to pass through
- **solution** — liquid containing dissolved solids

OBJECTIVE 2

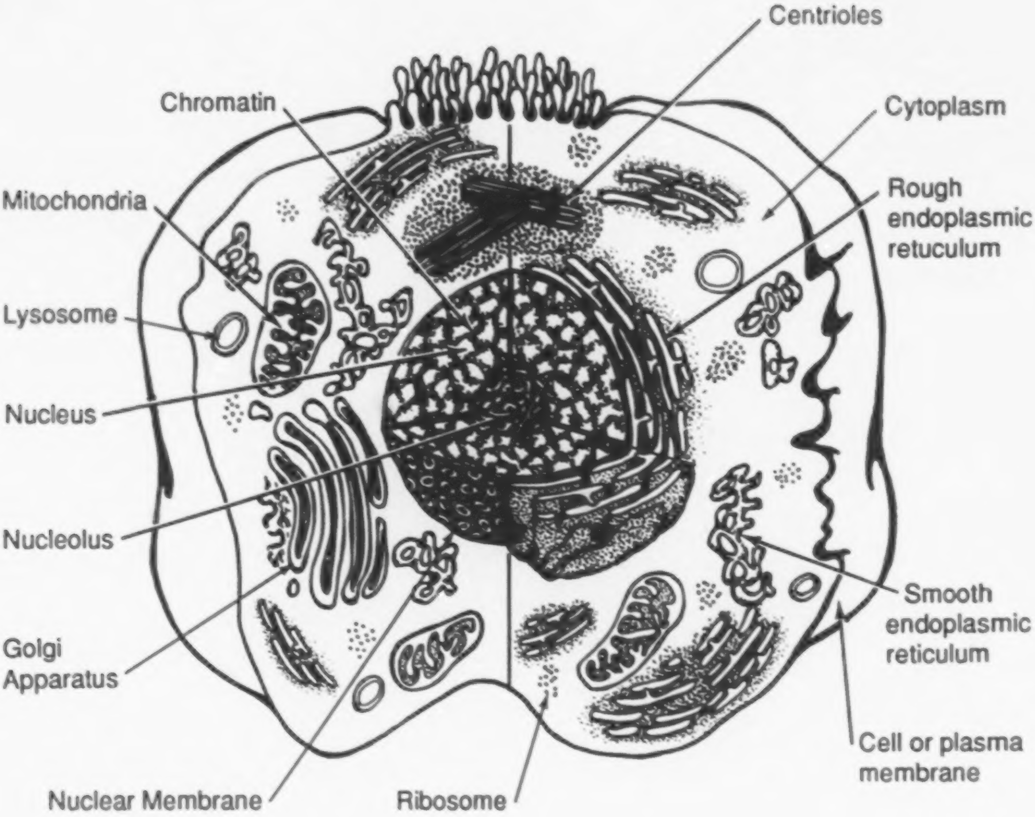
Choose the word or phrase that completes statements about homeostasis.

If you have ever tried to balance a heavy tray full of dishes, you know how much work it is to keep things in balance. In much the same way, the body works to keep everything in balance. This is described as homeostasis (*homeo*- the same; and *stasis*- standing still). Homeostasis is a means by which the body can react to outside changes, such as temperature, stress, or movement, while maintaining levels needed to function properly. Obviously, communication between the different body systems is important to homeostasis.

The body's communication system uses three components, the control center, effectors, and receptors. It also uses two types of signals, positive feedback and negative feedback.

- **control center** – determines levels, analyzes information, and determines responses
- **effector** – makes changes determined by the control center
- **receptor** – collects information and sends it to the control center
- **positive feedback** – messages sent from the control center to the effector to maintain or increase the response
- **negative feedback** – messages sent from the control center to the effector to depress or stop a response

OBJECTIVE 3 | **Label basic parts of the cell.**


Centrioles
Chromatin
Cytoplasm
Mitochondria
Rough endoplasmic retuculum
Lysosome
Nucleus
Nucleolus
Smooth endoplasmic reticulum
Golgi Apparatus
Cell or plasma membrane
Nuclear Membrane
Ribosome

BEST COPY AVAILABLE

OBJECTIVE 4

Match characteristics of a cell to their definitions.

- **adaptability** — the ability to adjust to changes in the environment
- **conductivity** — the ability to conduct heat or electricity
- **contractility** — the ability to draw in; to shrink
- **excretion** — the ability to throw off waste materials
- **growth** — the process of developing toward maturity
- **irritability** — the ability to respond to a stimulus
- **metabolism** — the chemical processes necessary to build up and break down living cells

  NOTE: There are two basic metabolic processes, anabolism and catabolism. During the anabolic process, simple substances are changed to complex compounds and energy is used. Building cells and storing fats are anabolic processes. During the catabolic process, complex compounds are broken down into simpler substances and energy is released. Digestion and burning calories by exercising are catabolic processes.

- **organization** — a unified group of components that work together in an orderly manner
- **reproduction** — the ability to produce new individual plants or animals
- **secretion** — the ability to make and release a substance, usually a liquid

OBJECTIVE 5

List functions of some of the components of a cell.

- Water
  - — Serves as the solvent
  - — Moderates temperature
- Protein
  - — Forms the structural framework
- Carbohydrates
  - — Provide energy

- Fats
  - Store energy
  - Provide extra energy when needed
- Nucleic acids
  - Control growth
  - Control reproduction

  NOTE: There are two types of nucleic acid: RNA and DNA. DNA (deoxyribonucleic acid) controls heredity. RNA (ribonucleic acid) transfers information from DNA to the cell.
- Mineral salts
  - Act as buffers in the acid-base balance
  - Maintain fluid and electrolyte balance
  - Aid in structure of the body

OBJECTIVE 6 **Match basic cell components to their definitions.**

These cell components are each individual organs called **organelles**. Each has its own structural parts separating it from the cytoplasm, and each has a specific function.

- **cell or plasma membrane** – the structure that surrounds the cell and regulates entry and exit of materials
- **centriole** – pair of hollow cylinders that separate during cell division, move to opposite ends of the cell, and produce the protein fibers that form part of the mitotic spindle
- **chromatin** – thread-like material in the cell nucleus made of DNA and protein that tightly coils and thickens to form chromosomes during cell division
- **chromosomes** – rod-shaped bodies in the nuclear material that determine heredity; formed from the chromatin during cell division (mitosis)
- **cytoplasm** – the colorless, transparent substance that contains dissolved salts and food substances

- **endoplasmic reticulum** – series of small tubes or tunnels that spiral through the cytoplasm

  NOTE: There are two types of endoplasmic reticulum, rough or granular and smooth or agranular.

- **Golgi apparatus** – organelles that remove proteins from the cell by surrounding the protein, fusing with the cell membrane, then rupturing the membrane and expelling the protein

- **lysosome** – organelles formed from the Golgi apparatus that contain strong digestive enzymes

- **mitochondria** – organelles that carry on chemical reactions and produce energy

- **nuclear membrane** – thick layer of protoplasm around the edge of the nucleus that regulates the passage of materials in and out of the nucleus

- **nucleolus** – small spherical body or bodies inside the nucleus where the RNA components of the ribosomes are built

- **nucleus** – the cell's control center that contains chromatin and DNA

- **ribosome** – organelles found throughout the cell that synthesize protein

OBJECTIVE 7 **Select from a list major functions of enzymes.**

- Act as a catalyst to speed chemical reactions in cells

- Break down food in the digestive tract

- React only with certain substances

  EXAMPLES: Ptyalin (mouth) reacts to starches; rennin (stomach) reacts to milk protein; pepsin (stomach) reacts to protein.

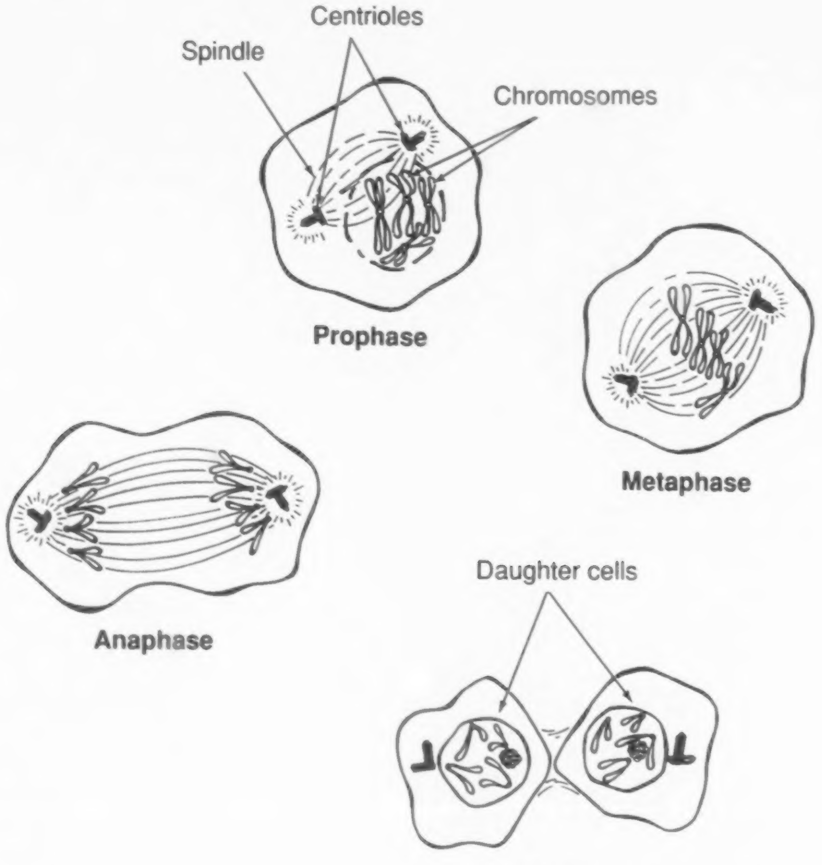
  NOTE: Enzymes are heat-sensitive proteins. There are over 650 known enzymes.

OBJECTIVE 8

Choose the word or phrase that completes statements about mitotic cell division.

Mitosis is the division of the cell nucleus and is usually followed by the division of the cytoplasm.

- Occurs in all human cells except nerve cells, sperm, and ova
- Gives rise to two identical daughter cells which are also identical to the parent cell
- Takes place in four stages: prophase, metaphase, anaphase, and telophase. Each features its own distinct physical changes.



Prophase

Metaphase

Anaphase

Telophase

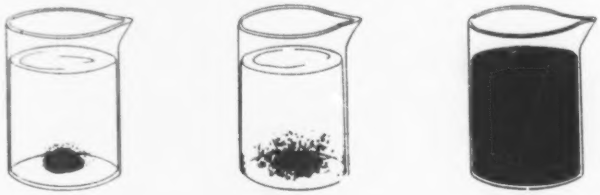
OBJECTIVE 9 **Distinguish between active and passive transport.**

- **passive transport** — requires no expenditure of energy to move from one side of the cell wall to the other side
- **active transport** — requires energy to move from one side of the cell to the other

OBJECTIVE 10 **Match types of passive transport movement to their definitions.**

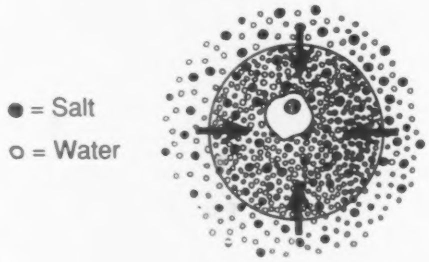
- **diffusion** — molecules or ions move from areas of high concentration to areas of low concentration until a balance is reached

  EXAMPLE: Dispersion of carbon dioxide and oxygen to areas of lesser concentration through the membrane of the lung.



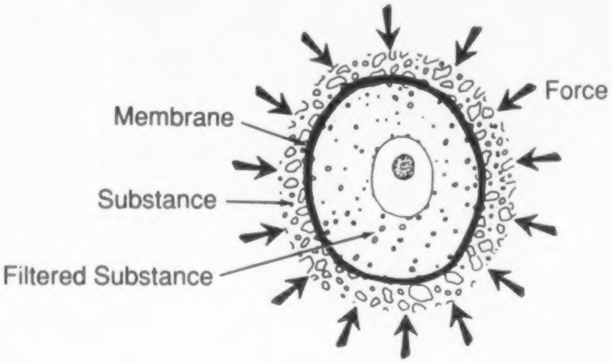
- **osmosis** — solvents (fluids) move from an area of lower concentration through a semi-permeable membrane to an area of higher concentration until a balance is reached

  EXAMPLE: When there is an increase in the amount of salt in tissue fluid, water moves into the tissues to lower the salt concentration.



- **filtration** — particles move through a filter or membrane that prevents passage of certain molecules

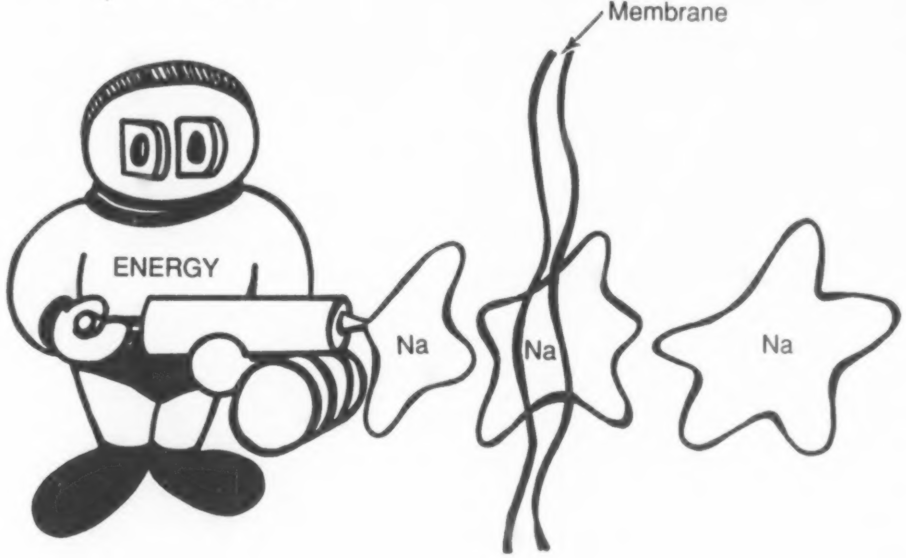
  EXAMPLE: The spleen filters the blood, removing wastes, old red blood cells, and foreign substances.


Membrane
Substance
Filtered Substance
Force

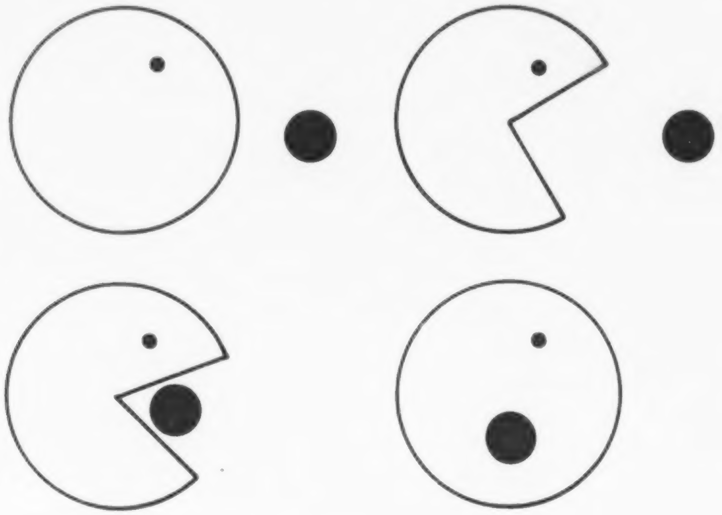
OBJECTIVE 11

Match types of active transport movement to their correct definitions.

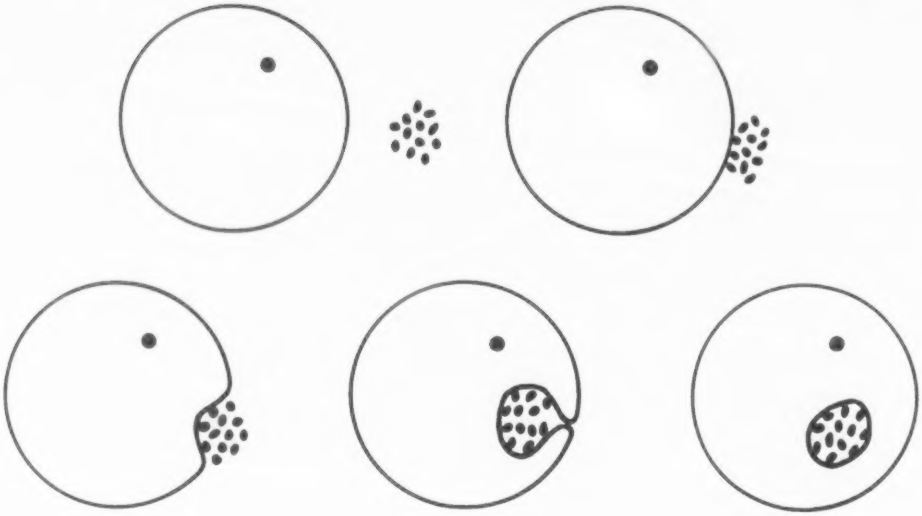
- **cell or physiological pump** – moves molecules or ions through the cell membrane, countering the tendency to disperse


Membrane
ENERGY
Na
Na
Na

- **phagocytosis (cell eating)** — engulfing a solid particle such as bacteria by surrounding the particle, enclosing it in a pocket or sac, detaching from the rest of the membrane, and migrating into the cell for digestion



- **pinocytosis (cell drinking)** — attracting liquid molecules to the cell membrane which sinks inward to form a pocket that breaks off from the rest of the membrane and is left inside the cell



OBJECTIVE 12

Match types of solutions to their definitions.

- **Isotonic solution** — contains the same concentration of dissolved particles as the solution with which it is compared

  NOTE: This is also called "normal solution."

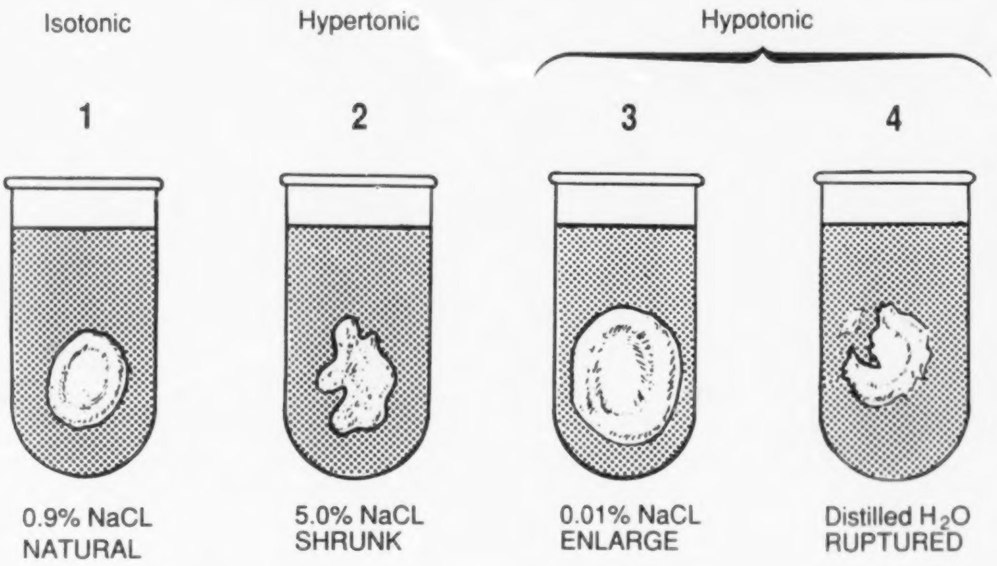
  EXAMPLE: Red blood cells normally exist in a 0.9 percent solution with the same concentration of salt in the outside solution.

- **hypertonic solution** — contains a greater concentration of dissolved particles than the solution with which it is compared

  EXAMPLE: If the solution outside the cell contains a higher content of salt, then osmosis takes place and water flows out of the cell, causing it to shrink and be destroyed (crenated)

- **hypotonic solution** — contains a lesser concentration of dissolved particles than the solution with which it is compared

  EXAMPLE: If the solution outside the cell contains a lower content of salt than normal, osmosis takes place and water flows into the cell. This makes the cell swell and can cause rupture (hemolysis).



OBJECTIVE 13

Match types of tissues to their functions.

The human body is composed of many cells which perform specialized tasks. These cells group together in an organized pattern and form tissue.

- **epithelial** — acts as a protective barrier from heat, cold, water loss, and bacterial invasion; aids in secretion and excretion

  EXAMPLES: Squamous, cuboidal, and columnar

- **connective** — protects, supports, and binds the body together

  NOTE: This is the most widespread type of tissue in the body.

  EXAMPLES: Adipose, bone, cartilage, and blood

- **muscle** — moves the body by contracting and relaxing muscle pairs

  EXAMPLES: Skeletal, visceral and cardiac

- **nerve** — conducts impulses throughout the body

  EXAMPLES: Neurons

OBJECTIVE 14

Match types of tissue membranes to their definitions.

- **mucous membranes** – secrete mucus and protect the walls of passageways that open to the outside of the body
- **serous membranes** – secrete fluids that lubricate surfaces of inner organs
- **cutaneous membranes** – cover and protect the body
- **synovial membranes** – line closed joint cavities and secrete lubricating fluid

OBJECTIVE 15

Define correct anatomical position.

Anatomical position is a standard position for anatomical descriptions and study. In the anatomical position, the body is standing erect with arms at the sides and palms facing forward.

NOTE: Always reference from the anatomical position. For instance, "the right side" refers to the patient's right side.

OBJECTIVE 16 **Match anatomical points of reference to their definitions.**

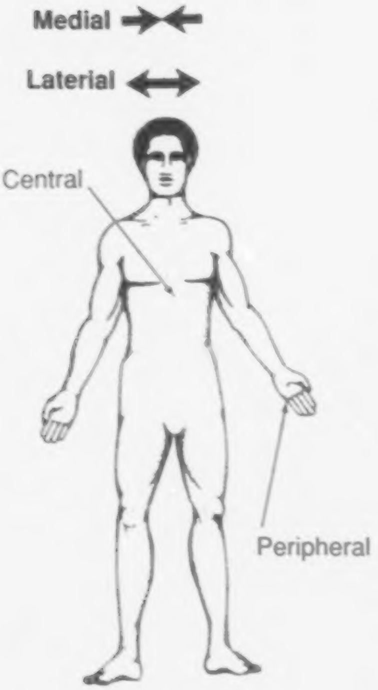
- **abdomen** — portion of the body between the thorax and pelvis
- **cranium** — skull
- **pelvis** — lowest part of the trunk
- **peritoneum** — serous membrane that lies over the viscera and lines the abdominal cavity
- **retroperitoneal** — behind the peritoneum
- **thorax** — chest
- **viscera** — internal organs enclosed within a cavity, especially the abdominal organs

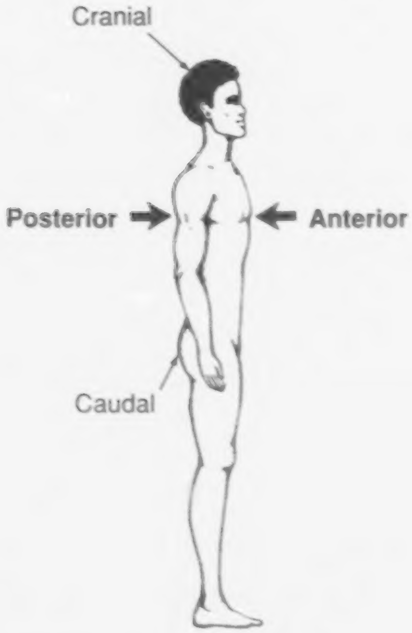
OBJECTIVE 17 **Match directional terms to their definitions.**

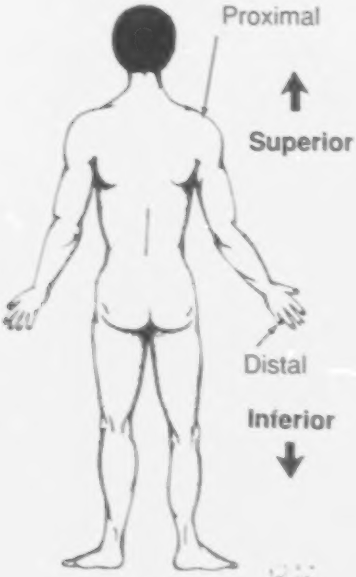
- **superior** — above
- **inferior** — below
- **anterior** — toward the front

  NOTE: Also called "ventral"
- **posterior** — toward the back

  NOTE: Also called "dorsal"
- **medial** — near the midline
- **lateral** – away from the midline
- **peripheral** — pertaining to the outer part
- **central** – pertaining to the core, or inner part
- **cranial** — near the head
- **caudal** — near the lower end of the spine
- **proximal** — nearest the origin of the structure
- **distal** — farthest from the origin of the structure


Medial
Lateral
Central
Peripheral


Cranial
Posterior
Anterior
Caudal


Proximal
Superior
Distal
Inferior

OBJECTIVE 18

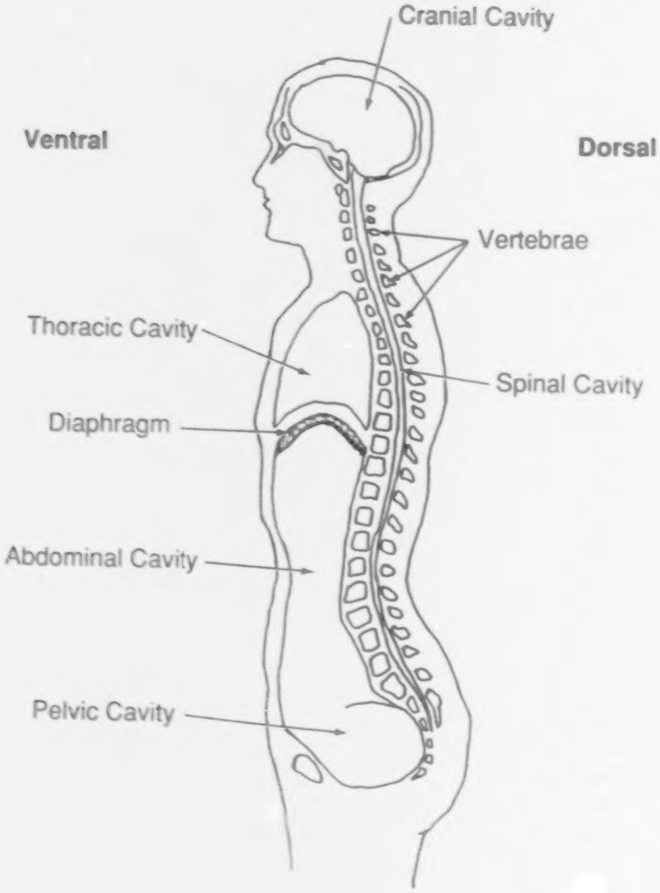
Label body cavities.

Dorsal

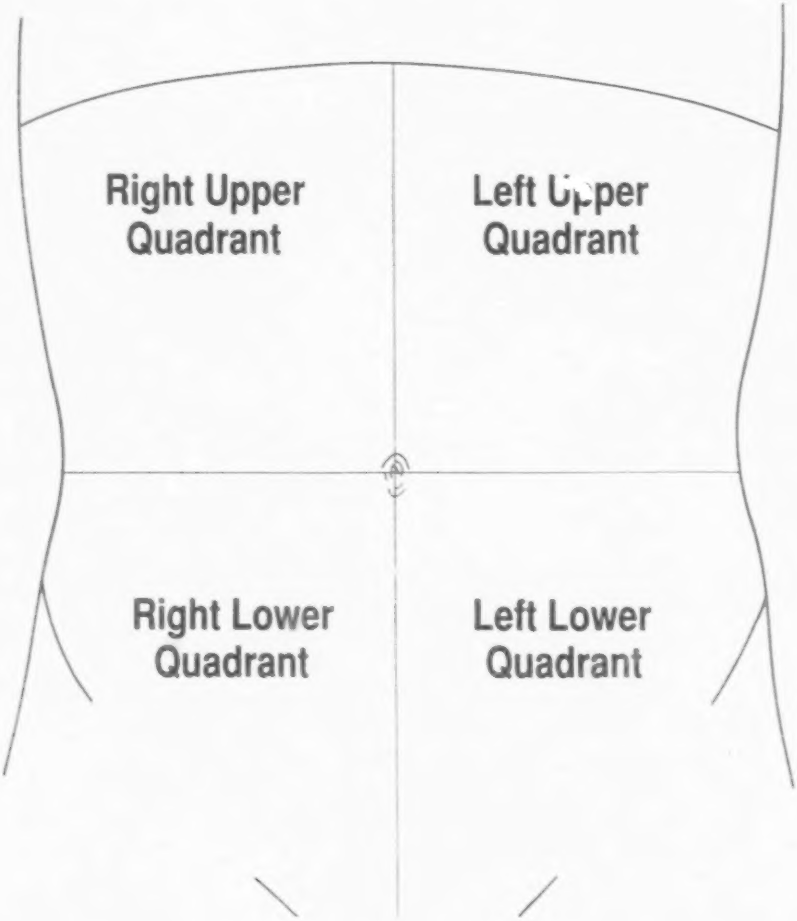
- Cranial
- Spinal

Ventral

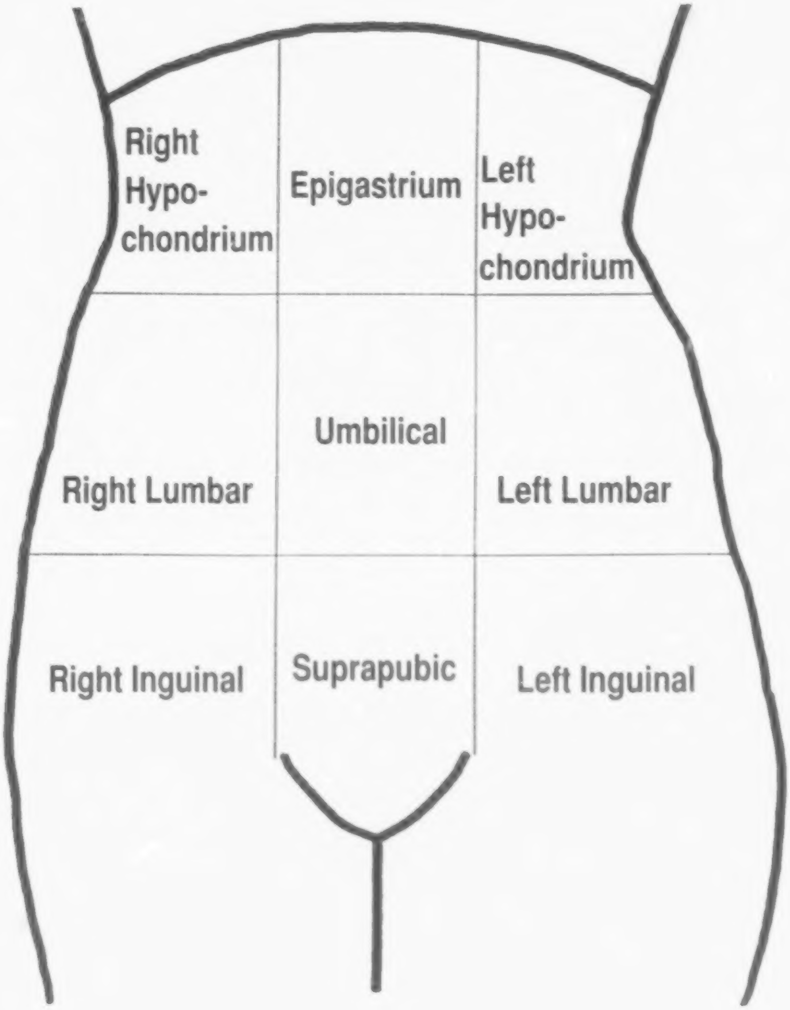
- Thoracic
- Abdominal
- Pelvic


Cranial Cavity
Ventral
Dorsal
Vertebrae
Thoracic Cavity
Spinal Cavity
Diaphragm
Abdominal Cavity
Pelvic Cavity

OBJECTIVE 19 | **Label quadrants of the abdominopelvic cavity.**


Right Upper Quadrant
Left Upper Quadrant
Right Lower Quadrant
Left Lower Quadrant

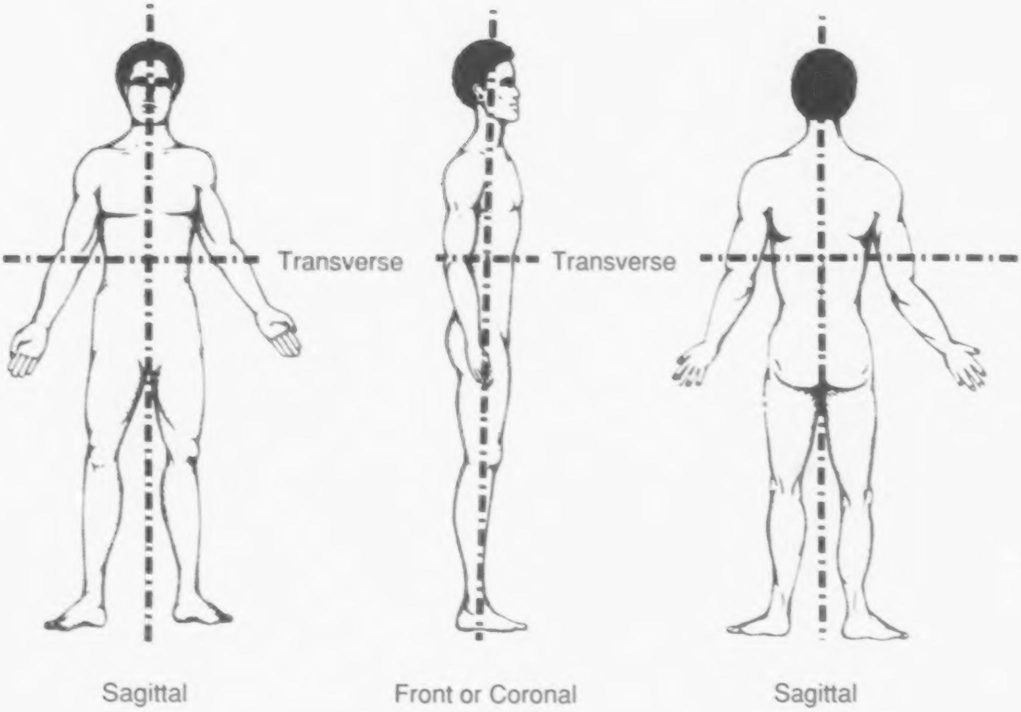
OBJECTIVE 20 | **Label abdominopelvic regions of the body.**


Right Hypo-chondrium
Epigastrium
Left Hypo-chondrium
Umbilical
Right Lumbar
Left Lumbar
Right Inguinal
Suprapubic
Left Inguinal

OBJECTIVE 21 **Match anatomical planes to their definitions.**

- **frontal or coronal** – separates front from back
- **sagittal** – separates the left side from the right side
- **transverse** – separates the upper half from the lower half

OBJECTIVE 22 **Label the anatomical planes.**


Transverse
Transverse
Sagittal
Front or Coronal
Sagittal

QUADRANTS OF THE ABDOMINOPELVIC CAVITY

Right upper quadrant (RUQ)

- Part of the small intestine including the descending duodenum
- The upper ascending colon
- Most of the liver
- Gallbladder
- Bile ducts
- Head of the pancreas
- Right adrenal gland
- Right kidney
- Upper part of right ureter

Left upper quadrant (LUQ)

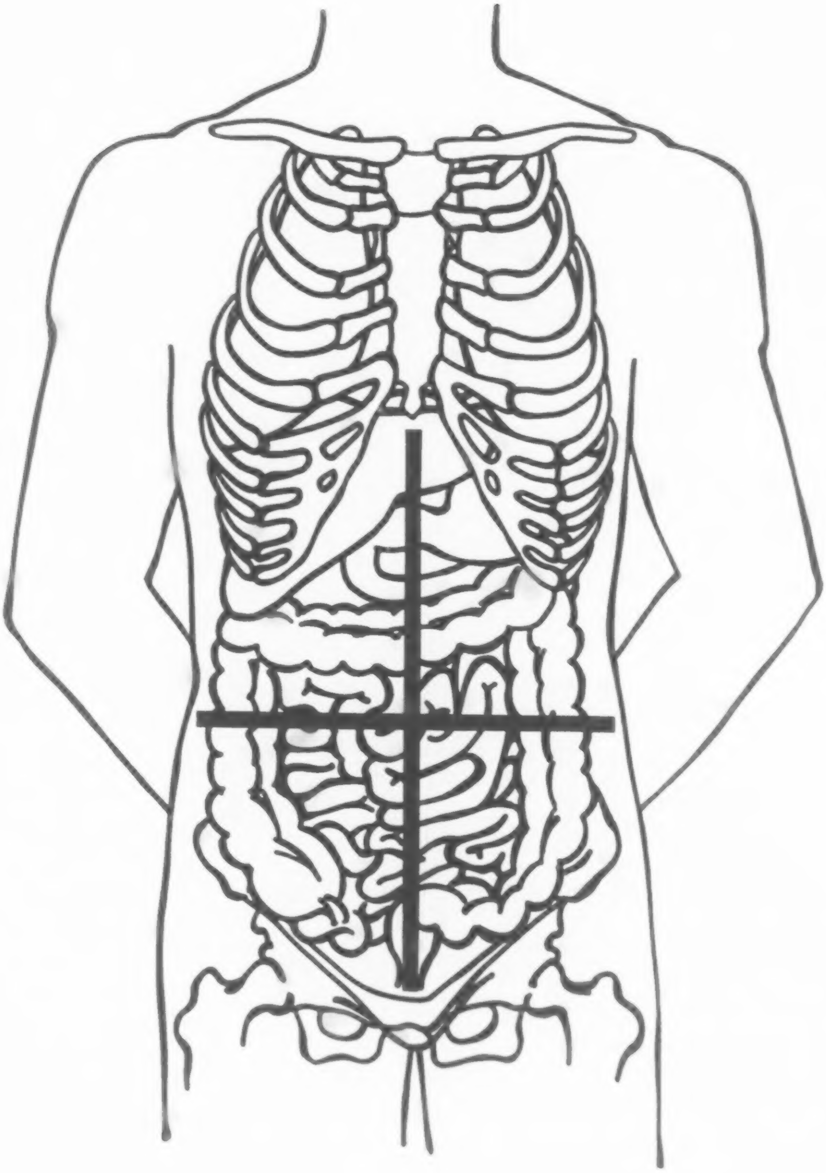
- Ascending part of duodenum
- Upper descending colon
- Left half of transverse colon
- Spleen
- Small part of liver
- Left adrenal gland
- Left kidney
- Upper part of left ureter
- Stomach

Right lower quadrant (RLQ)

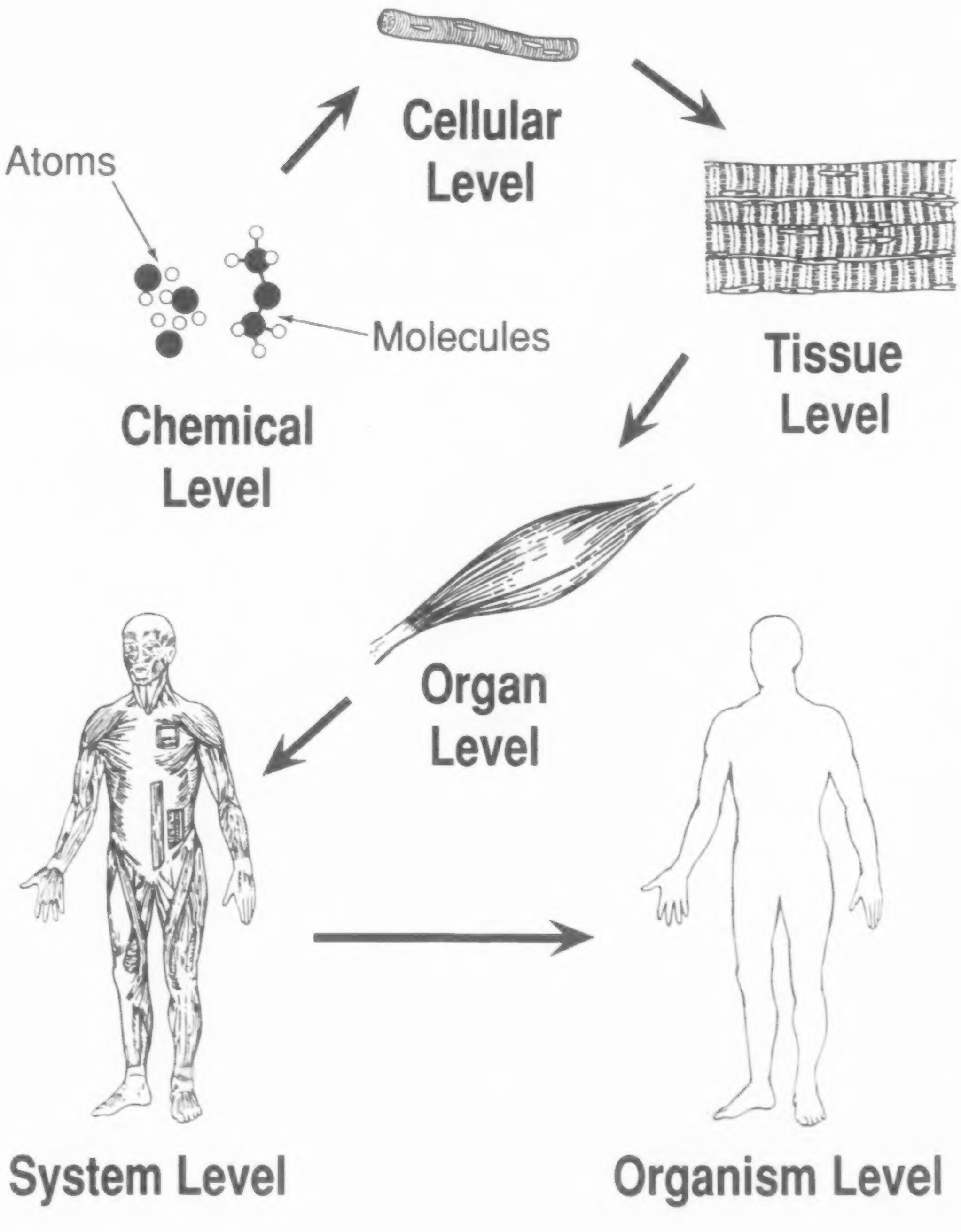
- Lower ascending colon
- Cecum
- Appendix
- Lower right ureter
- Terminal ileum
- Part of urinary bladder
- Sex organs

Left lower quadrant (LLQ)

- Lower descending colon
- Small intestine (part of ileum)
- Lower part of left ureter
- Part of urinary bladder
- Sex organs



Levels of Structural Organization



Atoms

Molecules

Chemical Level

Cellular Level

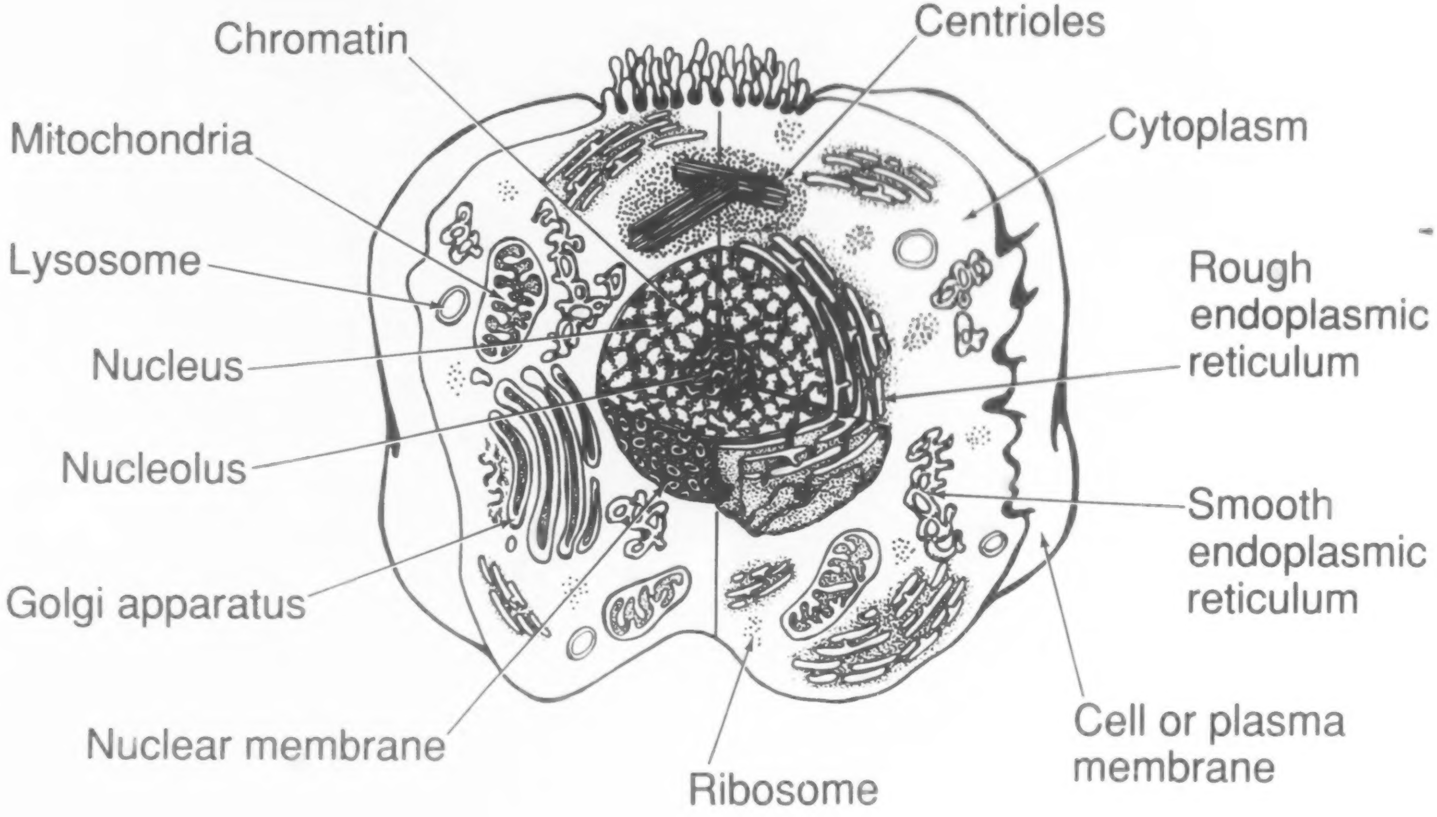
Tissue Level

Organ Level

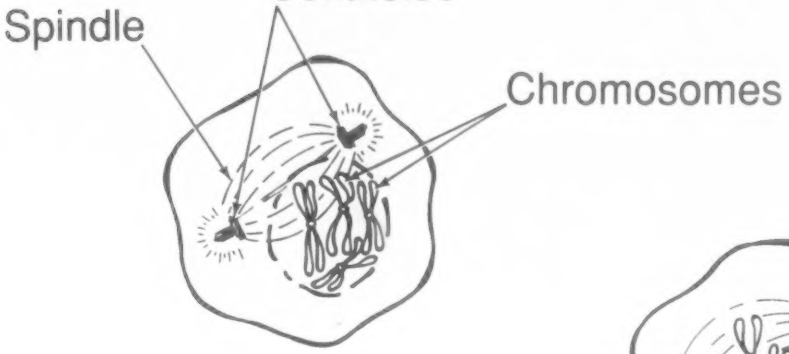
System Level

Organism Level

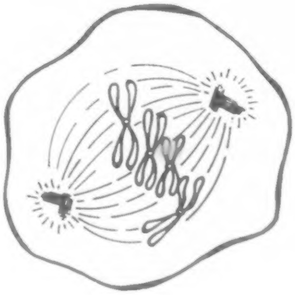
Basic Parts of a Cell


Chromatin
Centrioles
Mitochondria
Cytoplasm
Lysosome
Rough endoplasmic reticulum
Nucleus
Nucleolus
Smooth endoplasmic reticulum
Golgi apparatus
Cell or plasma membrane
Nuclear membrane
Ribosome

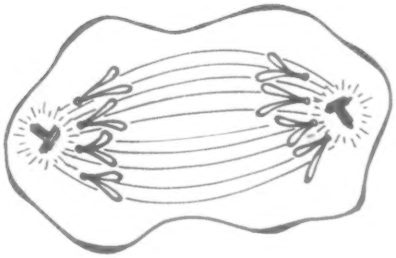
Stages of Mitosis


Spindle
Centrioles
Chromosomes

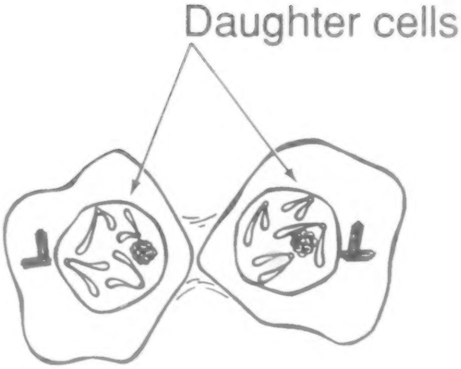
Prophase



Metaphase

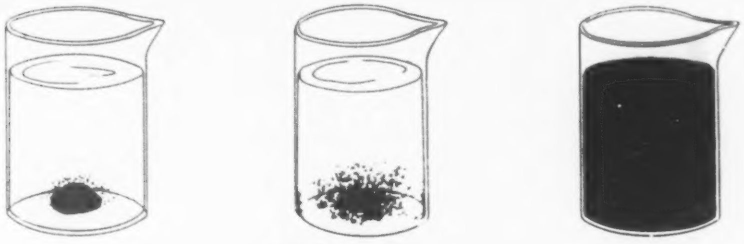


Anaphase

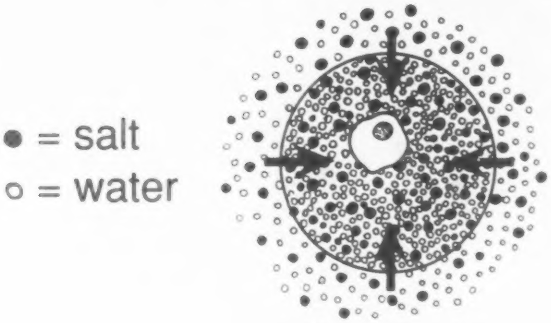

Daughter cells

Telophase

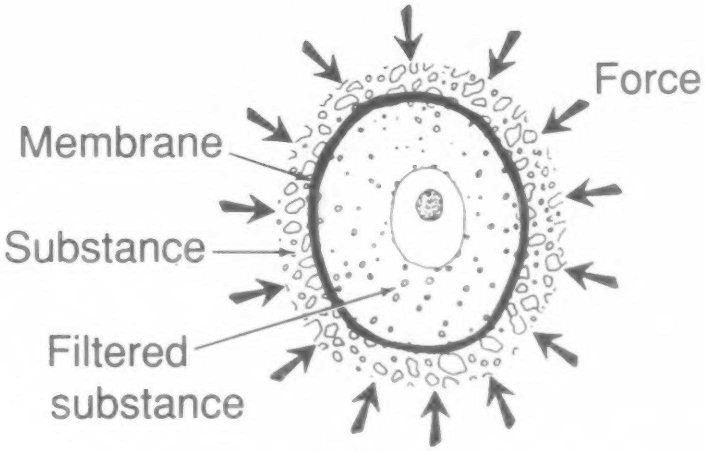
Physical/Passive Transport Methods of Cells



Diffusion



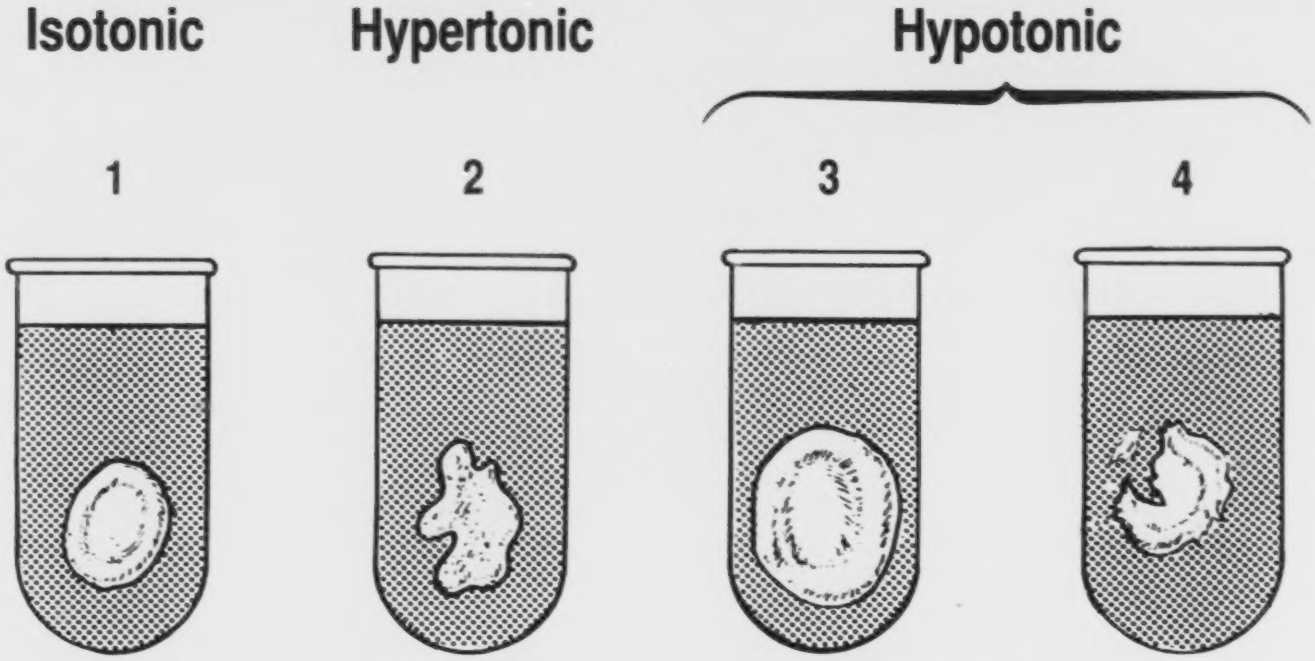
Osmosis


Force
Membrane
Substance
Filtered substance

Filtration

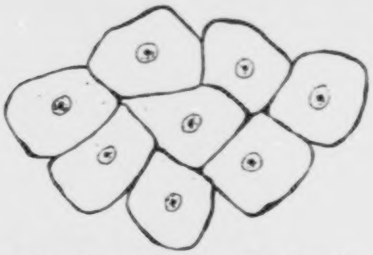
Solutions

Effect of Osmotic Pressure on Red Blood Cells

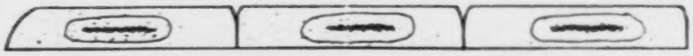


Isotonic	Hypertonic	Hypotonic	
1	2	3	4
0.9% NaCL NATURAL	5.0% NaCL SHRUNK	0.01% NaCL ENLARGED	Distilled H_2O RUPTURED

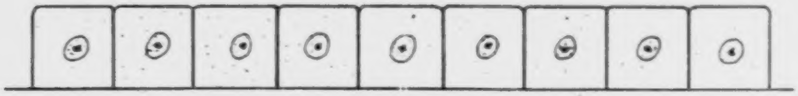
Epithelial Tissues



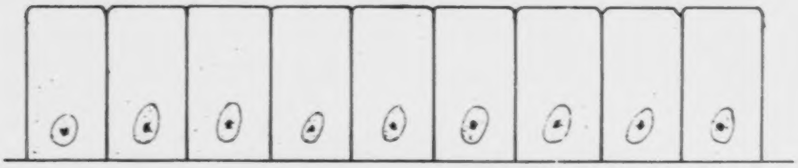
Simple Squamous Epithelium
(Surface View)



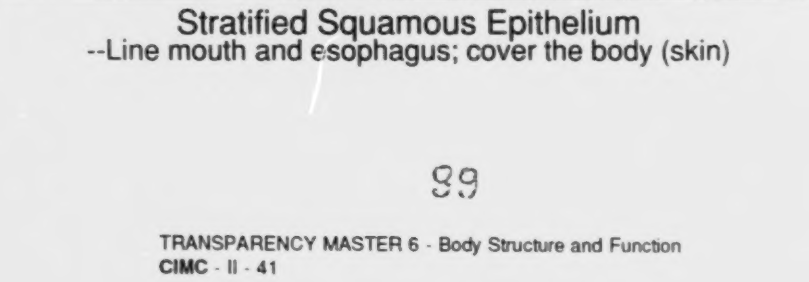
Simple Squamous Epithelium
--Line blood vessels, surface of pleura, peritoneum, and pericardium



Simple Cuboidal Epithelium

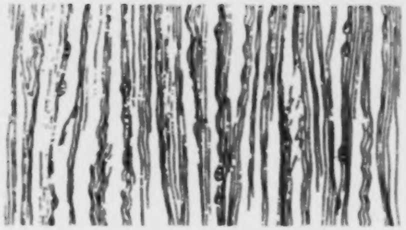


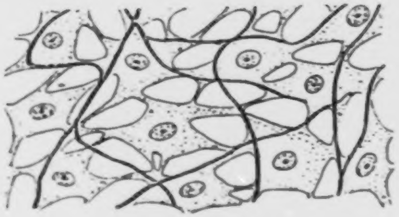
Simple Columnar Epithelium
--Line intestine, stomach, and part of respiratory tract

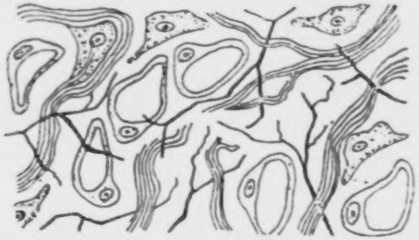


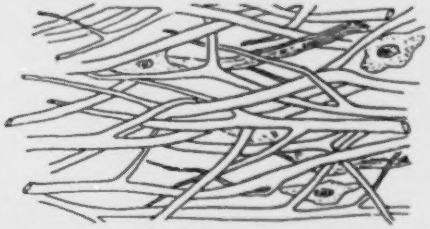
Stratified Squamous Epithelium
--Line mouth and esophagus; cover the body (skin)

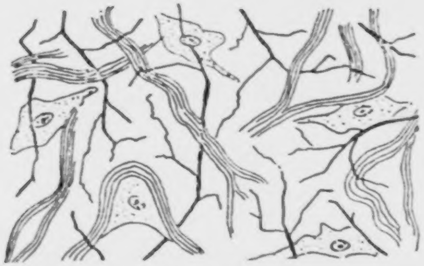
Connective Tissues

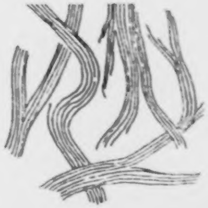

Fibrous Connective Tissue

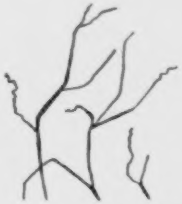

Reticular Connective Tissue


Adipose Connective Tissue

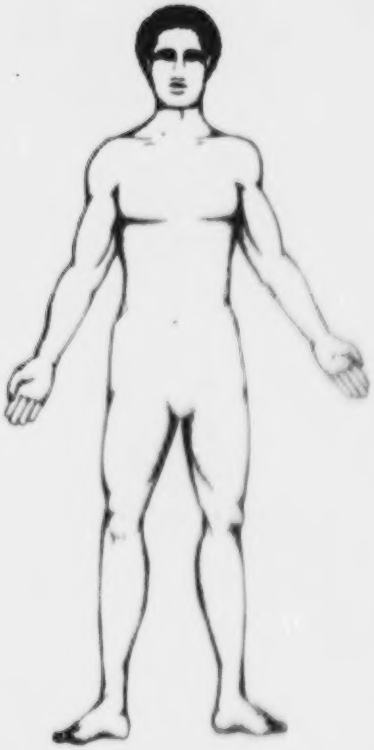

Elastic Connective Tissue


Areolar Connective Tissue

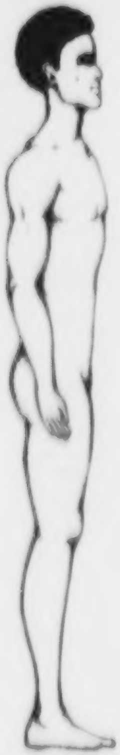

Collagenous Fibers


Elastic Fibers

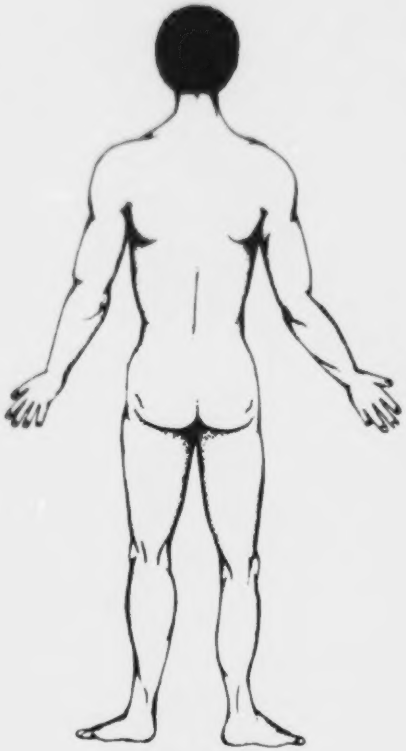
Anatomical Position



Anterior or Ventral View



Lateral View

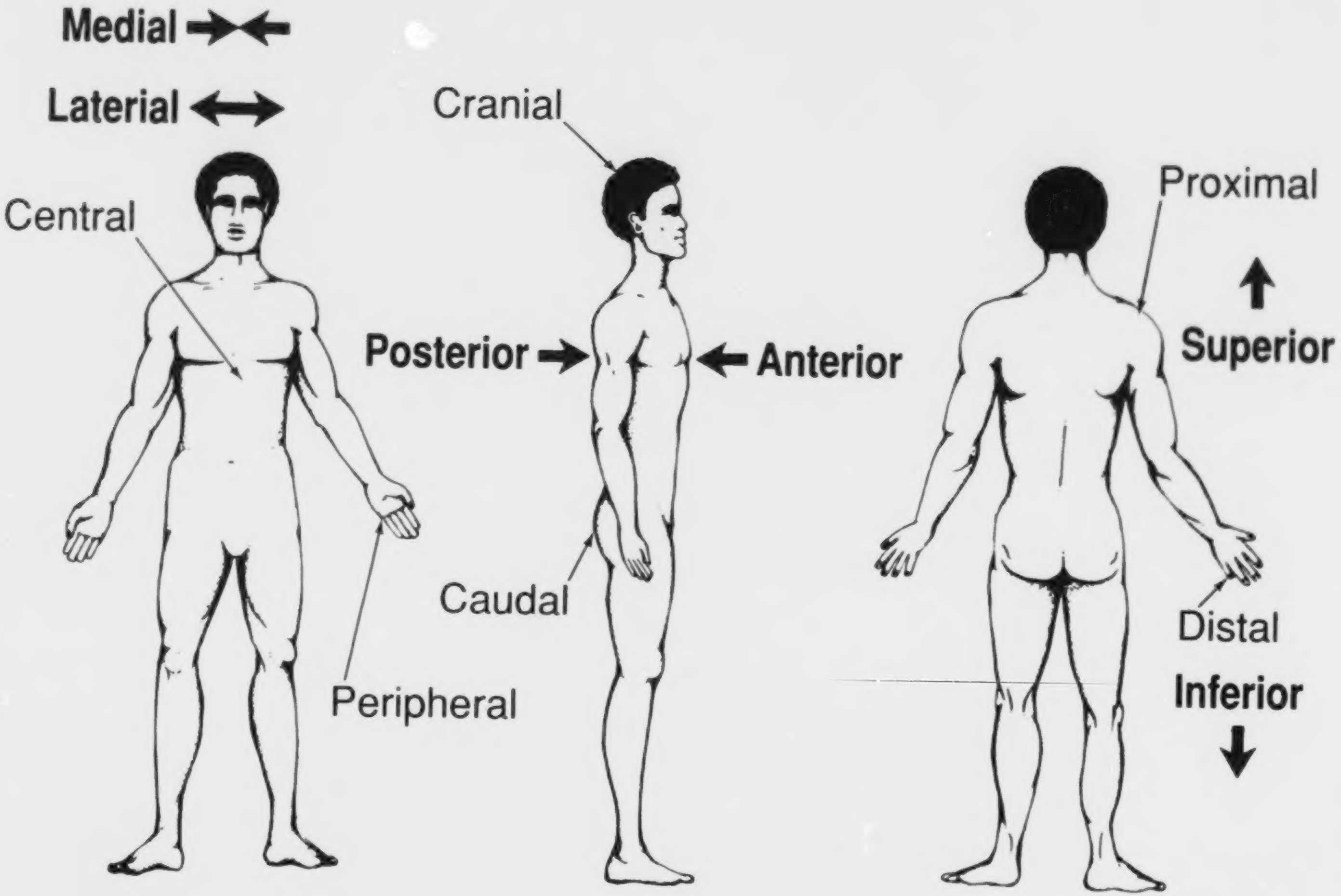


Posterior or Dorsal View

TRANSPARENCY MASTER 8 - Body Structure and Function
CIMC - II - 45

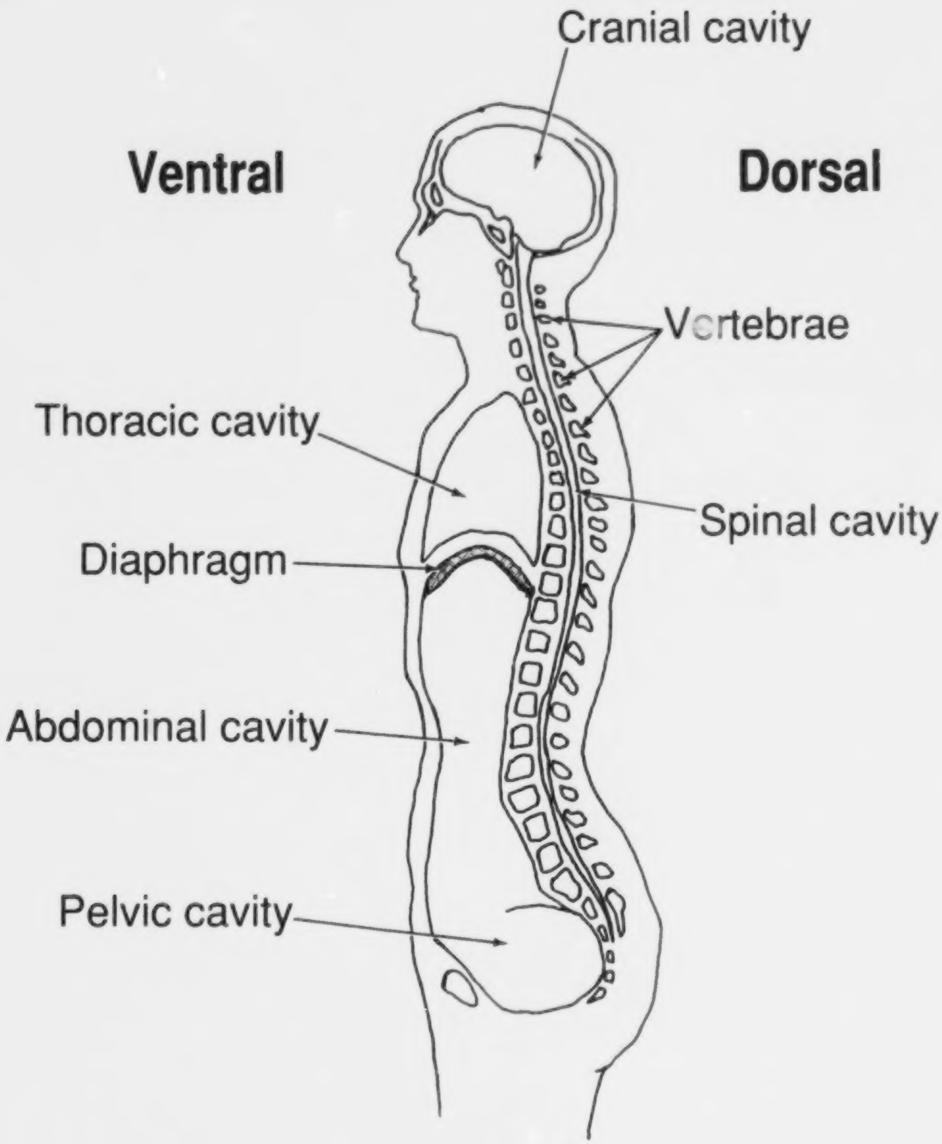
TM 8

Directions

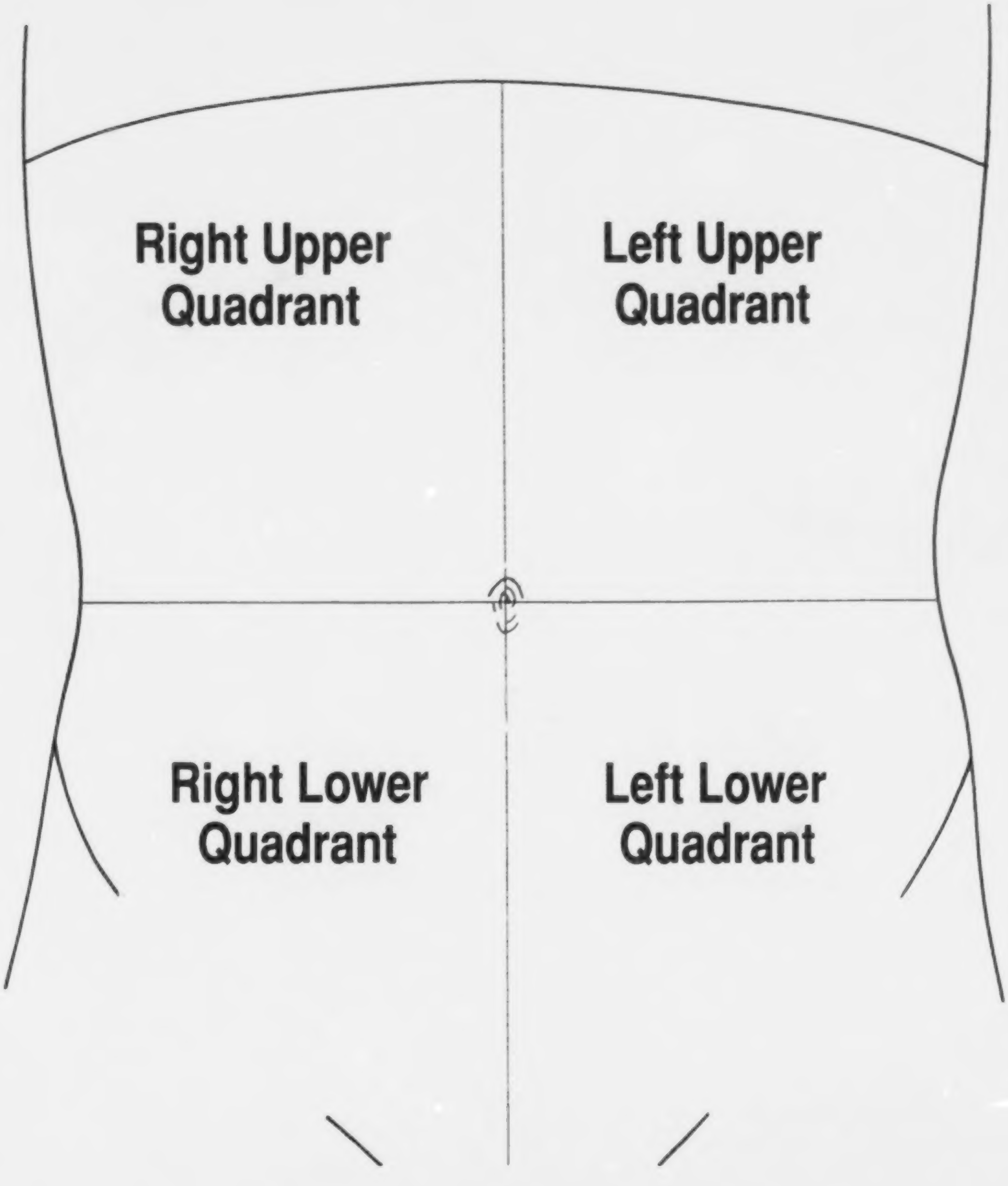

Medial
Laterial
Central
Peripheral
Cranial
Posterior
Anterior
Caudal
Proximal
Superior
Distal
Inferior

TRANSPARENCY MASTER 9 - Body Structure and Function
CIMC - II - 47

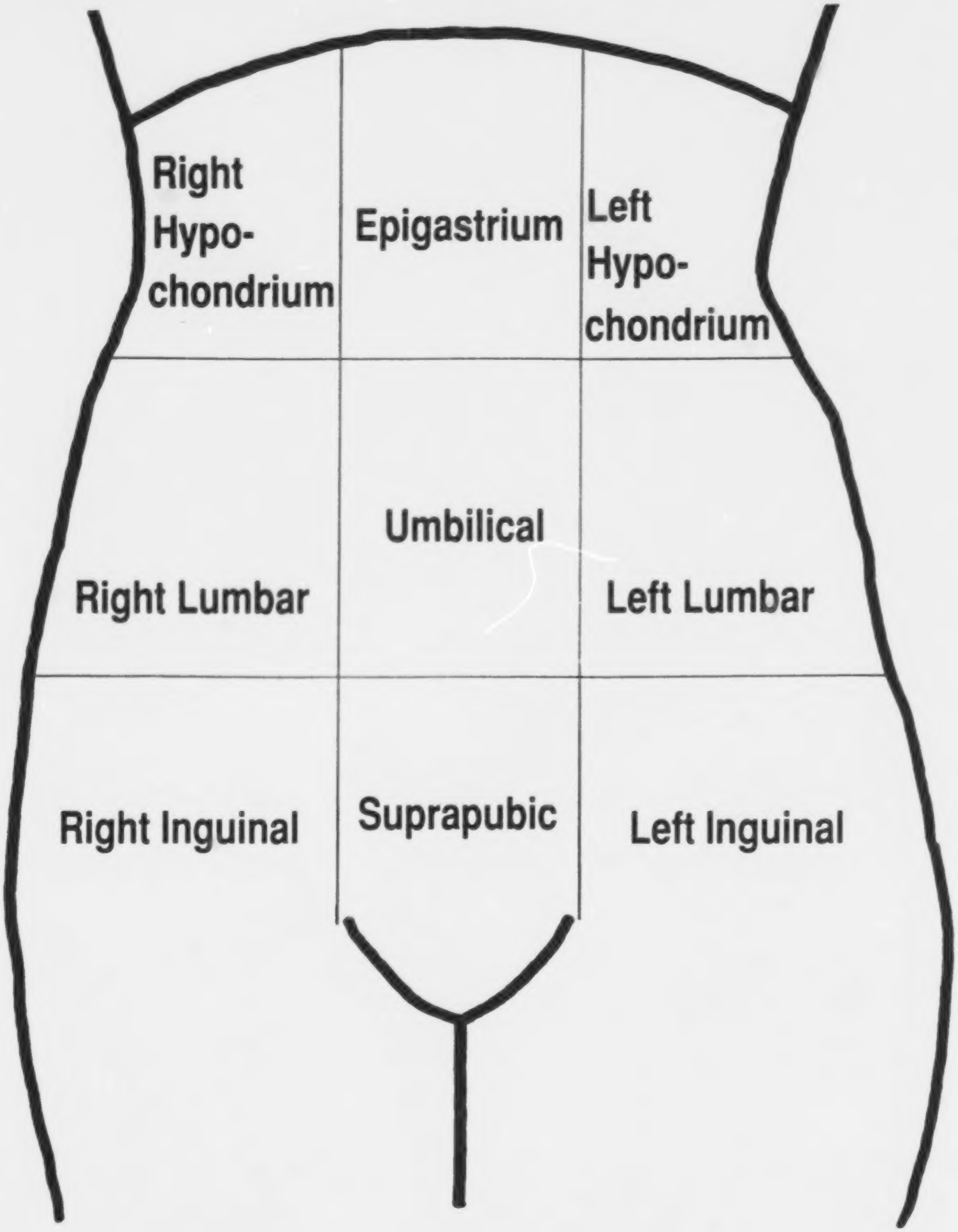
Body Cavities: Side View


Cranial cavity
Ventral
Dorsal
Vertebrae
Thoracic cavity
Spinal cavity
Diaphragm
Abdominal cavity
Pelvic cavity

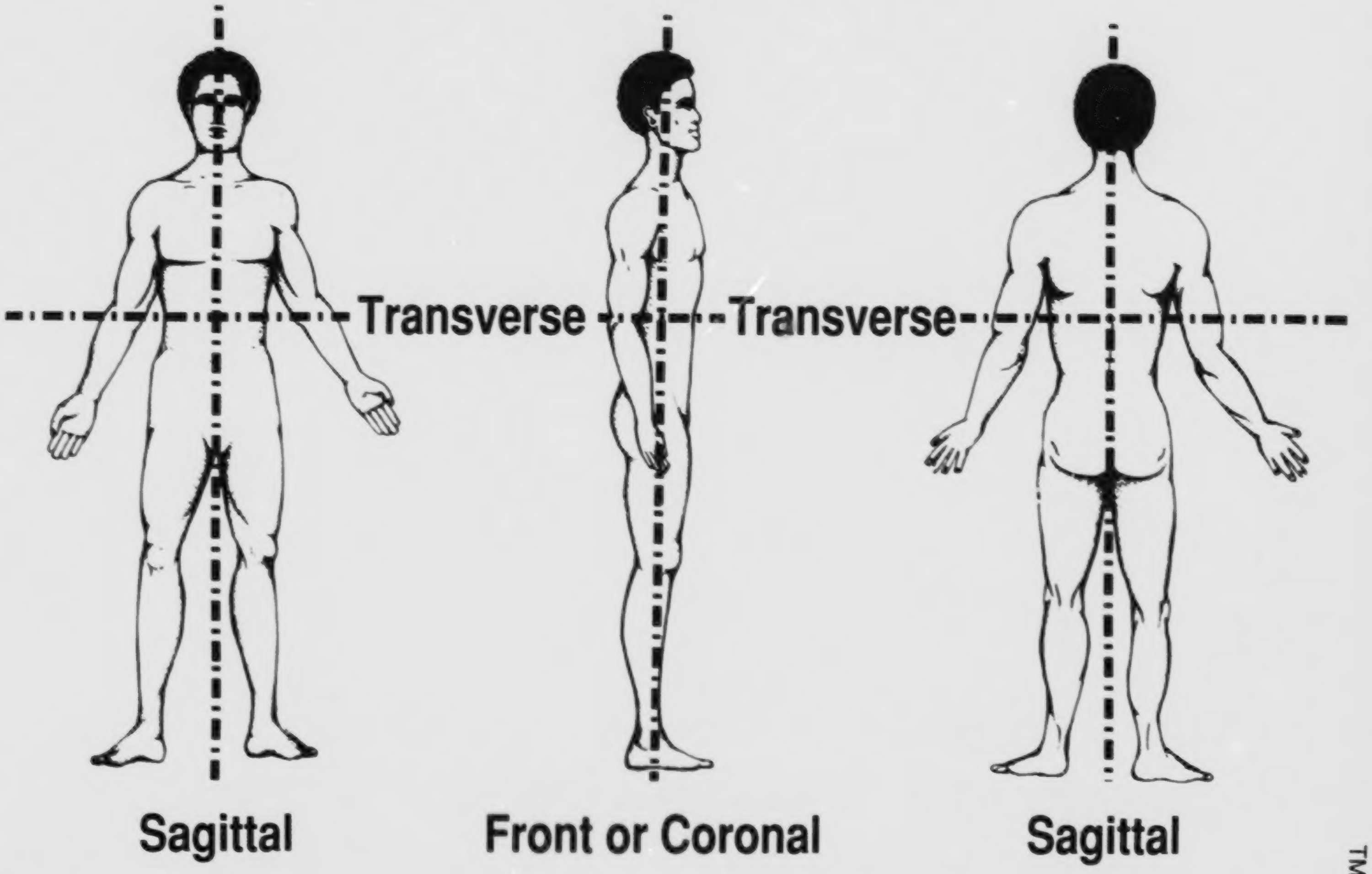
Quadrants of the Abdominopelvic Cavity


Right Upper Quadrant
Left Upper Quadrant
Right Lower Quadrant
Left Lower Quadrant

Regions of the Abdominopelvic Area


Right Hypo-chondrium
Epigastrium
Left Hypo-chondrium
Umbilical
Right Lumbar
Left Lumbar
Right Inguinal
Suprapubic
Left Inguinal

Planes


Transverse
Transverse
Sagittal
Front or Coronal
Sagittal

TRANSPARENCY MASTER 13 - Body Structure and Function
CIMC - II - 55

TM 13

ACTIVITY SHEET

Development of:
SCIENCE
INTERPERSONAL OR RELATING SKILLS

- Introduce the assignment to the students by discussing why science and interpersonal or relating skills are important.

- Discuss with them the following skills which are relevant to this task:

  SCIENCE SKILLS

  – Investigate/apply principles of anatomy/physiology

  INTERPERSONAL OR RELATING SKILLS

  – Participate in group activities

- If students have difficulty investigating/applying the principles of anatomy/physiology, such as basic anatomical positions, remind them that it is important in any area of work or study to have consistent ideas or principles that everyone uses. Apply this concept to directions such as left/right or north,south, east, and west. Discuss how hard it would be to give directions without these consistent terms.

- If students have difficulty participating in group activities:

  – Remind them of the importance of cooperation and compromise when working in groups. Ask them what would happen to their favorite sports team or musical group if one of the members decided not to do his or her share.

  – Discuss possible methods to use to settle disputes or arguments that might arise. Remind them of the importance of really listening to what others are saying and remembering that it isn't always necessary to get your own way.

  – Remind all the students that they will probably be working with groups of people throughout both their working and personal lives.

Life Science Skills

- Investigate/apply principles of anatomy/physiology

General Relating Skills

- Participate in group activities

As you learn about the different body systems, you will notice that anatomical illustrations almost always use the same anatomical pose. This pose, called the *anatomical position*, shows the person standing upright, facing straight ahead, with hands at the side, palms facing front. In this position, the body can be rotated without affecting relationships between body parts.

Demonstrate the anatomical position. With two other students, have one person take the position and the other two identify anatomical planes.

ASSIGNMENT SHEETS 1-2

Development of:
READING SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, science, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Use content area vocabulary

  SCIENCE SKILLS

  - Investigate/apply principles of anatomy/physiology

  - Conduct experiments

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Draw conclusions

  EMPLOYABILITY SKILLS

  - Developing effective leadership

- If students have difficulty using content area vocabulary:

  - Remind them that nearly every occupation or group uses words that have specific, specialized meanings to others in the same occupation or group. Have them name and define some content-area, technical, or "slang" words they are familiar with.

  - Explain that using content-area or technical words makes it easier for people within groups or occupations to communicate ideas accurately. Remind them that many times the same word may have a generic meaning to the majority of the people, but a very specific meaning within an industry.

  - Have the students suggest ways to learn the meanings of the vocabulary specific to anatomy and physiology. Provide opportunities for the students to practice using the terminology they will need to use.

- If students have difficulty investigating/applying principles of anatomy/physiology, review Instructional Supplement 1.

- If students have difficulty conducting experiments:

  - Remind them to read or listen carefully to all the instructions as they are presented before trying to start the experiment. If the instructions are given orally, suggest that they take notes so that an important step won't be forgotten.

  - Discuss with the students the importance of asking questions about anything they don't understand before beginning the experiment.

  - Discuss with them why it is critical to the success of an experiment that the directions be followed exactly. Explain that sometimes one small mistake can have disastrous results.

  - Provide opportunities for the students to read or listen to directions for conducting simple experiments. Ask a volunteer to explain how to complete each experiment. Have the other students discuss whether the experiment directions were stated correctly.

- If students have difficulty drawing conclusions:

  - Remind them that when they conduct an experiment, perform a job task, or even discuss a television show or movie, they will often be asked to demonstrate understanding by telling what happened and explaining why it happened.

  - Provide opportunities for the students to practice drawing conclusions by describing events, such as a group of people crowded around a table that has a decorated cake with lighted candles on it, and asking the students to decide what is happening and having them explain why they think as they do.

  - Remind the students that before they can draw conclusions, they must carefully observe what is happening and think about why it is happening. In more complex experiments, it is often a good idea to take notes about your conclusions as you work.

- If students have difficulty developing effective leadership:
    - Have the class discuss traits that make a person an effective leader.
    - Remind the students that an effective leader does not boss people needlessly or order other people to do his or her work–an effective leader is a person who can get a task finished by combining his or her talents with the talents of the other people to best complete a project. It is a person who can both suggest ideas and listen openly to the ideas of others. It is a person who can make an educated decision when necessary to the success of the project.
    - Provide students with opportunities to develop leadership skills by dividing the class into groups to plan and complete the assignment sheet activity or any other appropriate activity.
    - Work with the groups to ensure that each student has the opportunity and the information needed to lead one phase of the assignment.

ASSIGNMENT SHEET 1

BASIC CONCEPTS OF LIFE SCIENCE

II

Name ______________________________ Score ____________

OBJECTIVE 23

Demonstrate the transport of materials.

INTRODUCTION

Understanding the different types of movement is easier if you can see examples of each. These exercises will help you understand ways materials can move through liquids.

DIRECTIONS

General Science Skills
- Conduct experiments

Cognitive Activities Skills
- Draw conclusions

Job Acquisition/ Selection Skills
- Develop effective leadership

1. Fill a glass partially full of water. Use a rubber band to fasten a piece of dialysis tubing or animal membrane over the bottom of a funnel. Pour brown table syrup into the funnel. Set the funnel in the glass. The bottom of the funnel should be below the level of the water. Observe the two solutions. What happens to them? Why? What is this movement called?

____

____

____

____

2. Drop a tablet of dye, such as Easter egg dye, in one glass of water and a drop of food coloring in another glass of water. Which glass of water became evenly colored in the shorter length of time? Why? What is this movement called?

____

____

____

____

3. Prepare a mixture of dirt or coffee in water. Line a strainer, such as a tea strainer, with a piece of tissue or paper towel. Pour the dirt and water mixture through the lined strainer. What happened? Is the water clear or cloudy after it passes through the tissue? Why? What is this movement called?

ASSIGNMENT SHEET 2

BASIC CONCEPTS OF LIFE SCIENCE

II

Name ______________________________ Score ____________

OBJECTIVE 24

Use directional terms.

INTRODUCTION

Directional terms are used to describe the different areas of the body. To make these descriptions clear, terms are usually combined.

DIRECTIONS

On the drawing below, write a "1" on the area described by phrase number one, a "2" on the area described by phrase number two, etc.

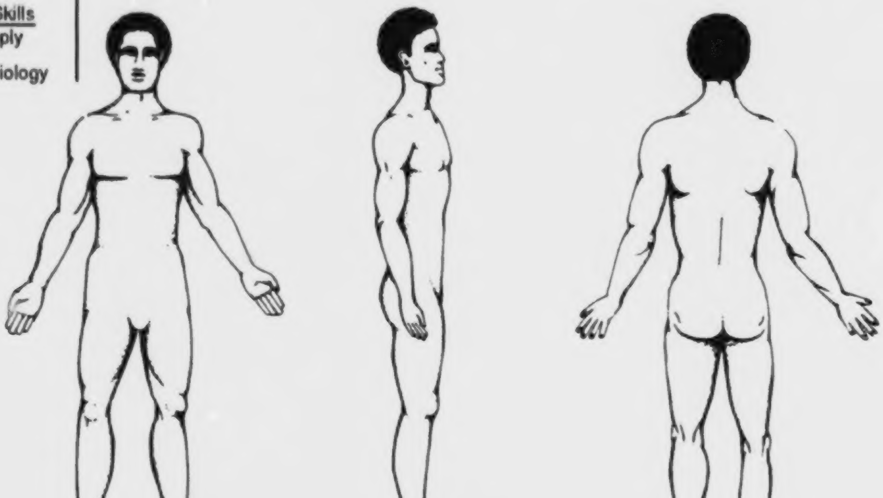
1. Superior medial chest
2. Proximal lateral left leg
3. Inferior dorsal right lateral rib cage
4. Anterior cranial neck
5. Medial caudal back
6. Left distal arm

Functional Reading Skills

- Use Content area vocabulary

Life Science Skills

- Investigate/apply principles of anatomy/physiology



ASSIGNMENT ANSWERS

BASIC CONCEPTS OF LIFE SCIENCE

II

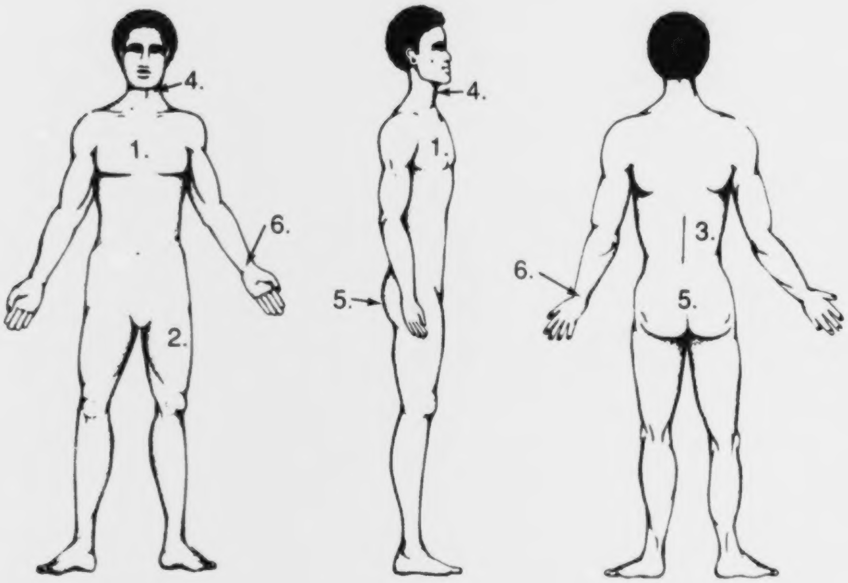
ASSIGNMENT SHEET 1

1. Water will pass through the tubing or membrane into the funnel to equalize the concentration on each side; osmosis.

2. The food coloring (liquid) will move throughout the water more quickly than the solid tablet will dissolve because the liquid is in a solvent state; diffusion.

3. The water will run through the tissue, leaving the dirt in the tissue. If the water is cloudy, it indicates either that some particles of the dirt dissolved and were able to pass through the tissue or the spaces in the tissue were too large and the smaller particles were able to pass through; filtration.

ASSIGNMENT SHEET 2



WRITTEN TEST

BASIC CONCEPTS OF LIFE SCIENCE II

Name ______________________ Score __________

OBJECTIVE 1 **Match terms associated with life science to their definitions.** Write the correct letter in the blank.

Part I

_____ 1. The simplest form of living matter that is capable of maintaining life and reproducing itself

_____ 2. The study of the structure, function, and reproduction of cells

_____ 3. The study of living organisms

_____ 4. Position, arrangement, or frequency of occurrence

_____ 5. Liquid containing dissolved solids

_____ 6. The study of the composition of substances and the changes they undergo

a. anatomy
b. cell
c. chemistry
d. concentration
e. cytology
f. distribution
g. ion
h. microbiology
i. solutions

Part II

_____ 1. Relative content or strength of an ingredient

_____ 2. Substances that conduct an electrical current when in solution

_____ 3. Will allow fluids, but not solid particles, to pass through

_____ 4. An atom or a group of atoms carrying an electrical charge

_____ 5. A hollow space

_____ 6. The study of the construction of the human body

a. anatomy
b. cavity
c. chemistry
d. concentration
e. distribution
f. electrolyte
g. ion
h. microbiology
i. semipermeable

OBJECTIVE 2

Choose the word or phrase that completes statements about homeostasis. Write the correct letter in the blank.

_____ 1. Homeostasis is the process in which the body keeps everything in

a. the most efficient operating condition possible
b. balance
c. proper working order
d. proper ratio

_____ 2. During homeostasis the body can react to outside changes, such as temperature, stress, or

a. movement
b. caloric intake
c. respiration rate
d. perspiration

_____ 3. The body's communication system uses three components, the control center, effectors, and

a. positive feedback
b. negative feedback
c. proprioceptors
d. receptors

May be photocopied for student use.

_____ 4. The control center determines levels, analyzes information, and determines

a. frequencies
b. temperatures
c. responses
d. positive feedback

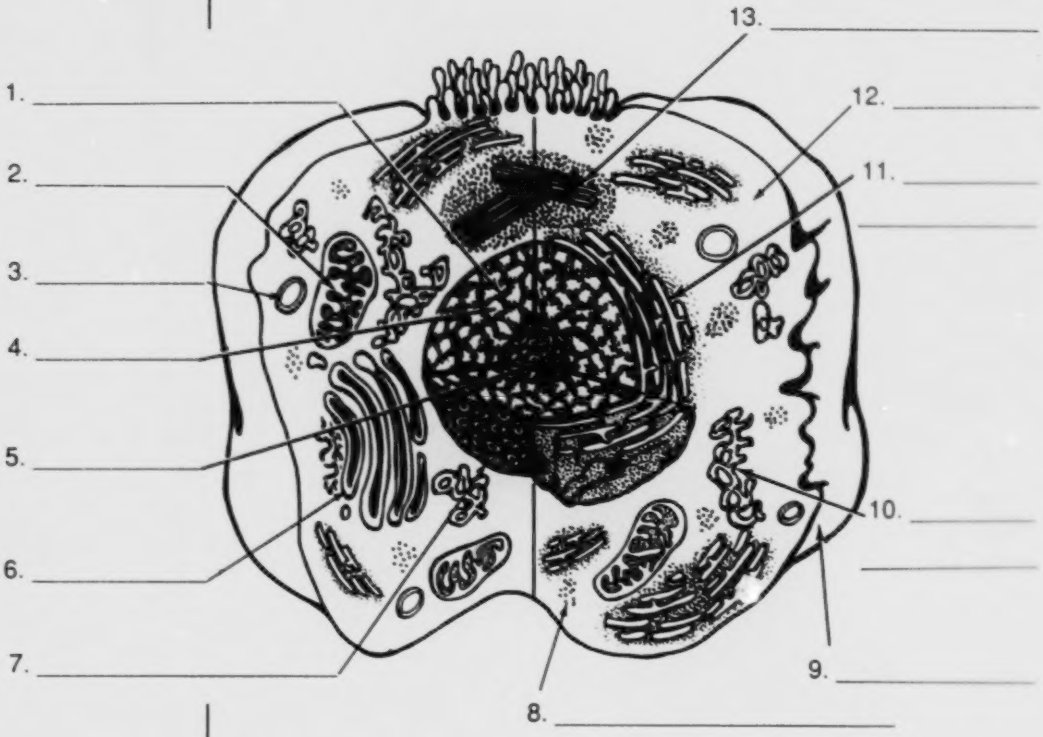
_____ 5. Changes determined by the control center are made by the

a. affectors
b. effectors
c. receptors
d. adjustors

_____ 6. Negative feedback is a set of messages sent from the control center to the effector to

a. depress or stop a response
b. begin or increase a response
c. neutralize a response
d. magnify a response

OBJECTIVE 3 | **Label basic parts of the cell.** Write the names in the blanks.



1. ____________________

2. ____________________

3. ____________________

4. ____________________

5. ____________________

6. ____________________

7. ____________________

8. ____________________

9. ____________________

10. ____________________

11. ____________________

12. ____________________

13. ____________________

May be photocopied for student use.

OBJECTIVE 4

Match characteristics of a cell to their definitions. Write the correct letter in the blank.

Part I

_____ 1. The ability to respond to a stimulus

_____ 2. The ability to draw in; to shrink

_____ 3. The ability to make and release a substance, usually a liquid

_____ 4. The chemical processes necessary to build up and break down living cells

_____ 5. Ability to produce new individual plants or animals

a. adaptability

b. contractility

c. irritability

d. metabolism

e. organization

f. reproduction

g. secretion

Part II

_____ 1. The ability to adjust to changes in the environment

_____ 2. A unified group of components that work together in an orderly manner

_____ 3. The process of developing toward maturity

_____ 4. The ability to conduct heat or electricity

_____ 5. The ability to throw off waste materials

a. adaptability

b. conductivity

c. excretion

d. growth

e. irritability

f. organization

g. secretion

May be photocopied for student use.

OBJECTIVE 5 **List functions of some of the components of a cell.** Write one function of each of the components listed.

1. Water

____

____

2. Protein

____

____

3. Carbohydrates

____

____

4. Fats

____

____

5. Nucleic acid

____

____

6. Mineral salts

____

____

May be photocopied for student use.

OBJECTIVE 6

Match basic cell components to their definitions. Write the correct letter in the blank.

Part I

_____ 1. Thread-like material in the cell nucleus made of DNA and protein that tightly coils and thickens to form chromosomes during cell division

_____ 2. Series of small tubes or tunnels that spiral through the cytoplasm

_____ 3. Thick layer of protoplasm around the edge of the nucleus that regulates the passage of materials in and out of the nucleus

_____ 4. Rod-shaped bodies in the nuclear material that determines heredity; formed from the chromatin during cell division (mitosis)

_____ 5. The cell's control center that contains chromatin and DNA

_____ 6. Organelles formed from the Golgi apparatus that contain strong digestive enzymes

a. cell or plasma membrane

b. chromatin

c. chromosome

d. endoplasmic reticulum

e. Golgi apparatus

f. lysosome

g. nuclear membrane

h. nucleus

i. ribosome

May be photocopied for student use.

Part II

_____ 1. Pair of hollow cylinders that separate during cell division, move to opposite ends of the cell, and produce the protein fibers that form part of the mitotic spindle

_____ 2. Organelles that carry on chemical reactions and produce energy

_____ 3. Small, spherical body or bodies inside the nucleus where the RNA components of the ribosomes are built

_____ 4. The structure that surrounds the cell and regulates entry and exit of materials

_____ 5. The colorless, transparent substance that contains dissolved salts and food substances

_____ 6. Organelles that remove proteins from the cell by surrounding the protein, fusing with the cell membrane, then rupturing the membrane and expelling the protein

_____ 7. Organelles found throughout the cell that synthesize protein

a. cell or plasma membrane

b. centriole

c. chromatin

d. cytoplasm

e. endoplasmic reticulum

f. Golgi apparatus

g. mitochondria

h. nucleolus

i. ribosome

May be photocopied for student use.

OBJECTIVE 7 **Select from a list major functions of enzymes.** Write an "X" in the blanks before major functions of enzymes.

_____ 1. Act as a catalyst to speed chemical reactions in cells

_____ 2. Distribute nutrients to cells

_____ 3. Break down food in the digestive tract

_____ 4. React only with certain substances

_____ 5. Determine the type of solution

OBJECTIVE 8 **Choose the word or phrase that completes statements about mitotic cell division.** Write the correct letter in the blank.

_____ 1. Mitotic cell division occurs

a. in epithelial cells
b. in all adult human cells
c. in all cells
d. in all human cells except nerve cells, sperm, and ova

_____ 2. The two daughter cells are

a. like the parent cell
b. like each other
c. like the parent and each other
d. like no other cells

_____ 3. Mitosis takes place in

a. two stages
b. four stages
c. six stages
d. eight stages

OBJECTIVE 9 **Distinguish between active and passive transport.** Write an "A" in the blank before characteristics of active transport and a "P" in the blank before characteristics of passive transport.

_____ 1. Requires no expenditure of energy to move from one side of the cell wall to the other side of the cell

_____ 2. Requires energy to move from one side of the cell to the other

May be photocopied for student use.

OBJECTIVE 10

Match types of passive transport movement to their definitions. Write the correct letter in the blank.

_____ 1. Molecules or ions move from areas of high concentration to areas of low concentration until a balance is reached

_____ 2. Solvents (fluids) move from an area of lower concentration through a semi-permeable membrane to an area of higher concentration until a balance is reached

_____ 3. Particles move through a filter or membrane that prevents passage of certain molecules

a. circulation

b. diffusion

c. dispersion

d. filtration

e. osmosis

OBJECTIVE 11

Match types of active transport movement to their definitions. Write the correct letter in the blank.

_____ 1. Engulfing a solid particle such as bacteria by surrounding the particle, enclosing it in a pocket or sac, detaching from the rest of the membrane, and migrating into the cell for digestion

_____ 2. Moves molecules or ions through the cell membrane, countering the tendency to disperse

_____ 3. Attracting liquid to the cell membrane, which sinks inward to form a pocket that breaks off from the rest of the membrane and is left inside the cell

a. cell or cyclical pump

b. cell or physiological pump

c. phagocytosis

d. pinocytosis

e. pumpocytosis

May be photocopied for student use.

OBJECTIVE 12

Match types of solutions to their definitions. Write the letter in the blank.

_____ 1. Contains a greater concentration of dissolved particles than the solution with which it is compared

_____ 2. Contains a lesser concentration of dissolved particles than the solution with which it is compared

_____ 3. Contains the same concentration of dissolved particles as the solution with which it is compared

a. hyperbolic solution

b. hypertonic solution

c. hypotonic solution

d. hypotrophic solution

e. isometric solution

f. isotonic solution

OBJECTIVE 13

Match types of tissues to their functions. Write the correct letter in the blank.

_____ 1. Conducts impulses throughout the body

_____ 2. Moves the body by contracting and relaxing muscle pairs

_____ 3. Protects, supports, and binds the body together

_____ 4. Acts as a protective barrier from heat, cold, water loss, and bacterial invasion; aids in secretion and excretion

a. bone

b. connective

c. epithelial

d. mucous

e. muscle

f. nerve

May be photocopied for student use.

OBJECTIVE 14 **Match types of tissue membranes to their definitions.** Write the letter in the blank.

_____ 1. Secrete fluids that lubricate surfaces of inner organs

_____ 2. Line closed joint cavities and secrete lubricating fluid

_____ 3. Secrete mucus and protect the walls of passageways that open to the outside of the body

_____ 4. Cover and protect the body

a. cutaneous membranes

b. mucous membranes

c. serous membranes

d. sinus membranes

e. synovial membranes

f. thoraxic membranes

OBJECTIVE 15 **Define correct anatomical position.**

____

____

____

____

May be photocopied for student use.

OBJECTIVE 16

Match anatomical points of reference to their definitions. Write the correct letter in the blank.

_____ 1. Behind the peritoneum

_____ 2. Lowest part of the trunk

_____ 3. Serous membrane that lies over the viscera and line of the abdominal cavity

_____ 4. Skull

_____ 5. Internal organs enclosed within a cavity, especially the abdominal organs

_____ 6. Portion of body between thorax and pelvis

_____ 7. Chest

a. abdomen

b. anatomical position

c. basic position

d. cranium

e. pelvis

f. peritoneum

g. plane

h. retroperitoneal

i. rib cage

j. thorax

k. viscera

OBJECTIVE 17

Match directional terms to their definitions. Write the correct letter in the blank.

Part I

_____ 1. Toward the back

_____ 2. Near the head

_____ 3. Below

_____ 4. Toward the front

_____ 5. Above

_____ 6. Near the lower end of the spine

a. superior

b. inferior

c. posterior

d. anterior

e. proximal

f. distal

g. caudal

h. cranial

i. peripheral

May be photocopied for student use

Part II

_____ 1. Nearest the origin of the structure

_____ 2. Pertaining to the outer part

_____ 3. Near the midline

_____ 4. Farthest from the origin of the structure

_____ 5. Away from the midline

_____ 6. Pertaining to the core, or inner part

a. superior

b. inferior

c. peripheral

d. medial

e. proximal

f. distal

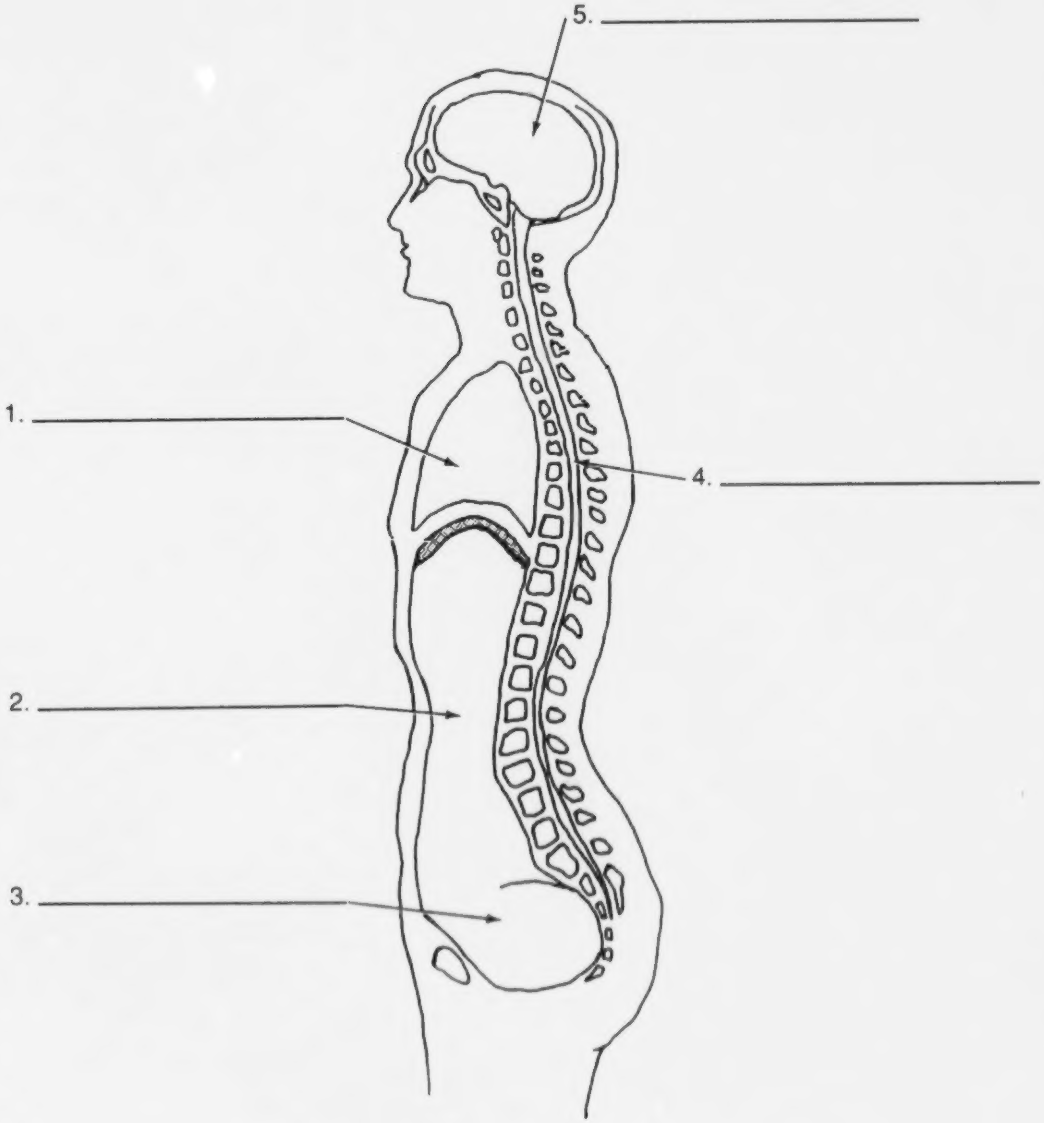
g. lateral

h. central

i. anterior

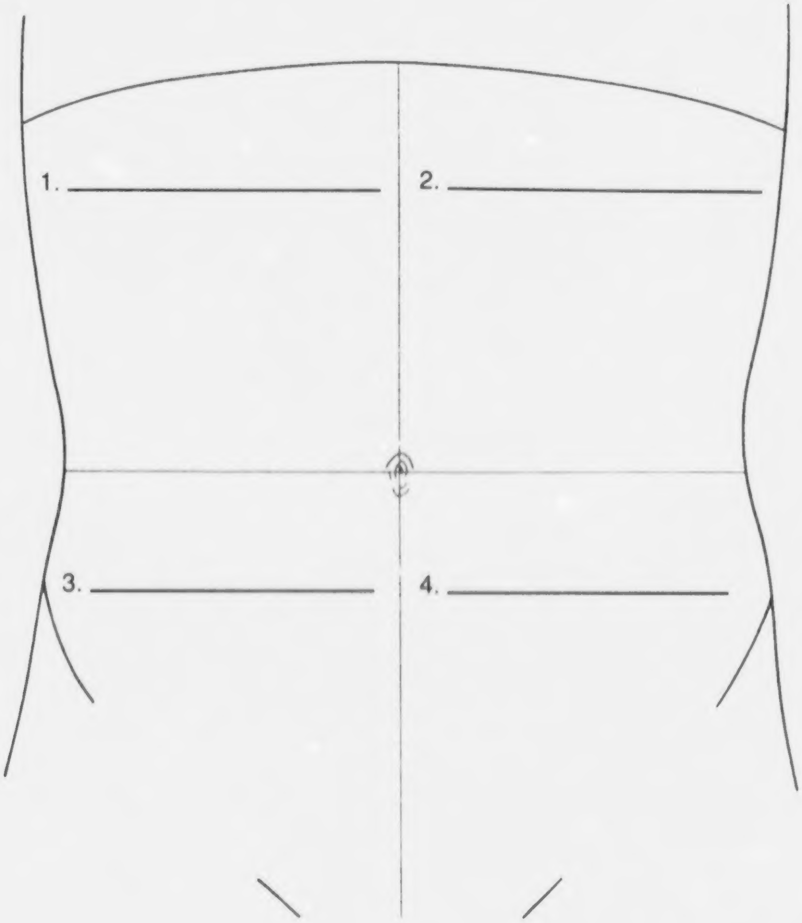
May be photocopied for student use.

OBJECTIVE 18 | **Label body cavities.** Write the cavity name in the blank.



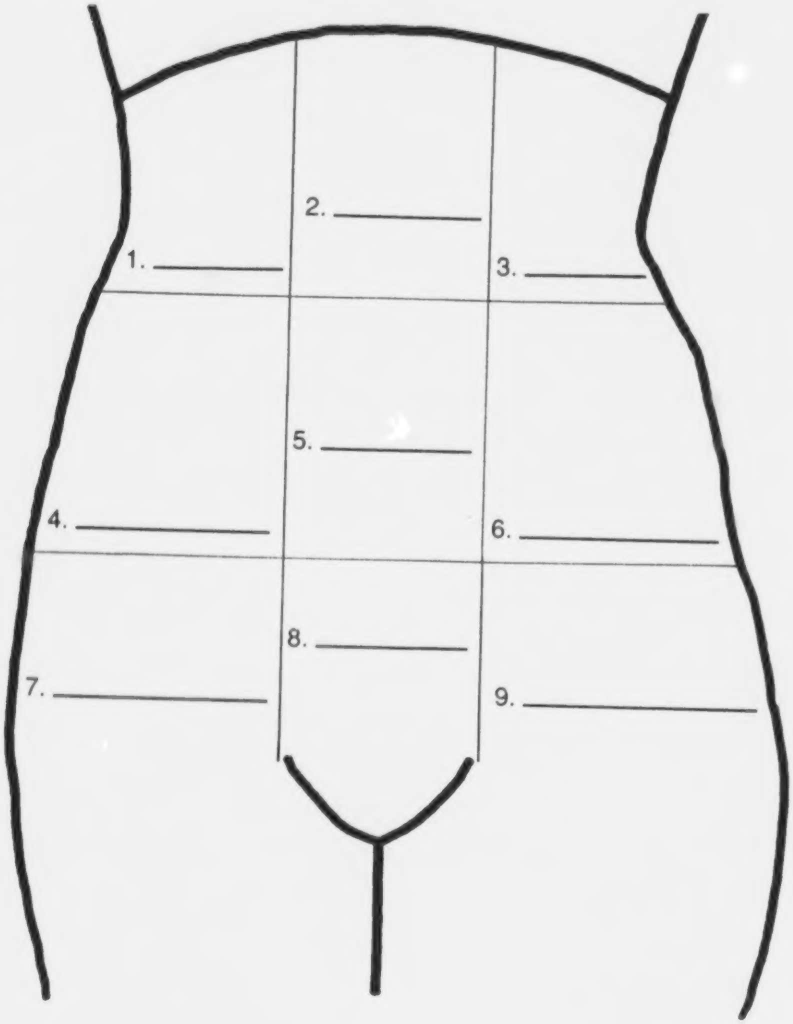
May be photocopied for student use.

OBJECTIVE 19 | **Label quadrants of the abdominopelvic cavity.** Write the name of the quadrant in the correct space in the diagram.



May be photocopied for student use.

OBJECTIVE 20 | **Label abdominopelvic regions of the body.** Write the name of the region in the correct space on the diagram.



May be photocopied for student use.

OBJECTIVE 21

Match anatomical planes to their definitions. Write the correct letter in the blank.

_____ 1. Separates the left side from the right side

_____ 2. Separates front from back

_____ 3. Separates the upper half from the lower half

a. frontal

b. frontal or coronal

c. sagittal or coronal

d. sagittal

e. transverse

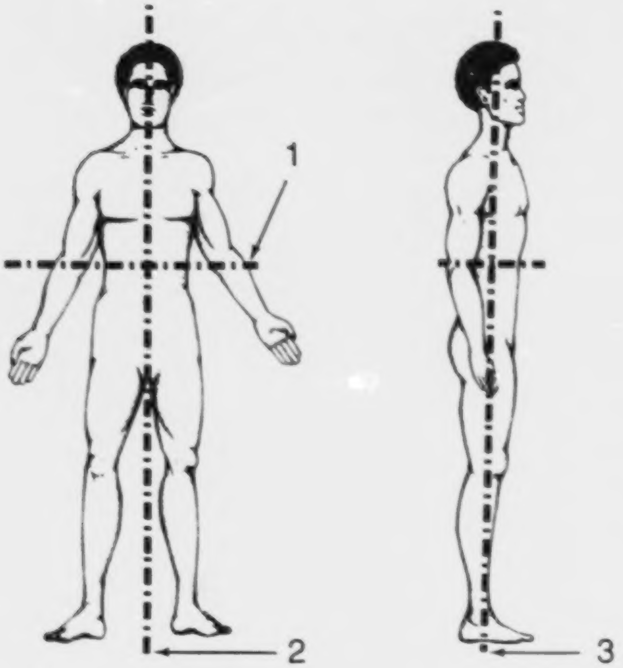
OBJECTIVE 22

Label anatomical planes.

1. ______________________________

2. ______________________________

3. ______________________________



NOTE: Objectives 23 and 24 are evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

BASIC CONCEPTS OF LIFE SCIENCE

II

OBJECTIVE 1

Part I	Part II
1. b	1. d
2. e	2. f
3. h	3. i
4. f	4. g
5. i	5. b
6. c	6. a

OBJECTIVE 2

1. b	6. a
2. a	
3. d	
4. c	
5. b	

OBJECTIVE 3

1. chromatin
2. mitochondria
3. lysosome
4. nucleus
5. nucleolus
6. Golgi apparatus
7. ribosome
8. cell or plasma membrane
9. smooth endoplasmic reticulum
10. rough endoplasmic reticulum
11. cytoplasm
12. centrioles

OBJECTIVE 4

Part I	Part II
1. c	1. a
2. b	2. f
3. g	3. d
4. d	4. b
5. f	5. c

OBJECTIVE 5

1. Serves as a solvent, moderates temperature
2. Forms structural framework
3. Provide energy
4. Store energy and provide extra energy
5. Control growth and reproduction
6. Act as a buffer in the acid-base balance; maintain fluid and electrolyte balance; aid in body structure

OBJECTIVE 6

Part I		Part II	
1.	b	1.	b
2.	d	2.	g
3.	g	3.	h
4.	c	4.	a
5.	h	5.	d
6.	f	6.	f
		7.	i

OBJECTIVE 7

1, 3, 4

OBJECTIVE 8

1. d
2. c
3. b

OBJECTIVE 9

1. P
2. A

OBJECTIVE 10

1. b
2. e
3. d

OBJECTIVE 11

1. c
2. b
3. d

OBJECTIVE 12

1. b
2. c
3. f

OBJECTIVE 13

1. f
2. e
3. b
4. c

OBJECTIVE 14

1. c
2. e
3. b
4. a

OBJECTIVE 15

Definitions should include:

- A standard position
- Body stands erect
- Arms at side
- Palms forward

OBJECTIVE 16

1. h
2. e
3. f
4. d
5. k
6. a
7. j

OBJECTIVE 17

	Part I		Part II
1.	c	1.	e
2.	h	2.	c
3.	b	3.	d
4.	d	4.	f
5.	a	5.	g
6.	g	6.	h

OBJECTIVE 18

1. Thoracic
2. Abdominal
3. Pelvic
4. Spinal
5. Cranial

OBJECTIVE 19

1. Right upper quadrant (RUQ)
2. Left upper quadrant (LUQ)
3. Right lower quadrant (RLQ)
4. Left lower quadrant (LLQ)

OBJECTIVE 20

1. Right hypochondrium
2. Epigastric
3. Left hypochondrium
4. Right lumbar
5. Umbilical
6. Left lumbar
7. Right inguinal
8. Suprapubic
9. Left inguinal

OBJECTIVE 21	1.	d
	2.	b
	3.	e
OBJECTIVE 22	1.	Transverse
	2.	Sagittal
	3.	Frontal or coronal

MICROBIOLOGY AND BACTERIOLOGY

INTRODUCTION

What causes disease? How is it spread? Can the spread be controlled? These questions and their answers have revolutionized medical practices. From sterilizing surgery instruments to proper handwashing techniques, the control of disease-causing microorganisms affects all facets of medical treatment.

UNIT OBJECTIVE

After completing this unit the student will be able to relate types of microbes and factors affecting microbe growth to disease identification, spread, and prevention. The students will be able to identify cultured microorganisms and community resources that protect against their spread. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85% accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with microbiology and bacteriology to their definitions.
2. Select from a list vital functions of living organisms.
3. Name the five factors that influence the growth of microorganisms.
4. Match classes of microorganisms to their descriptions.
5. Distinguish among diseases caused by protozoa, fungi, and rickettsiae.
6. Select from a list diseases caused by viruses.
7. List the four basic types of parasitic helminths (worms) that can infect the human body.
8. Label forms and types of bacteria.
9. Distinguish among specialized structures of bacteria.
10. Define endotoxins and exotoxins.
11. Complete statements about growth factors that influence pathogens.

12. Determine how organisms are spread.

13. Evaluate community resources that protect against harmful microorganisms. (Assignment Sheet)

PREPARATION

- Review the unit and plan your presentation.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Determine how you will schedule time for students to demonstrate competency in the required procedures.
- Order materials to supplement the unit.
- Obtain prepared slides and microscopes from places such as National Teaching Aid, Inc. 120 Fulton Avenue, Garden City Park, New York 11040.
- Obtain Glow Germ and black light bulbs. Glow Germ is available from Glow Germ Company, P.O. Box 537, Moab, Utah 84532. 1-800-842-6622.
- Invite a guest speaker to discuss epidemiology, public health, and microbe identification.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. You may want to supply the objective sheet, information sheet and any other components you want covered. Confirm the scheduled appearance 2-3 days prior to the presentation.
- Obtain models and large pictures of protozoa, fungi bacteria, helminth, and rickettsiae.
- Make a poster of how disease is spread.
- Make a bulletin board showing factors affecting microbe growth.
- Devise games and/or crossword puzzles to reinforce terms or groupings.
- Arrange for a field trip to a medical laboratory.
- Arrange for a field trip to a local water sanitation plant.

- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.
  - Assist students in scheduling and presenting prepared and extemporaneous speeches.
  - Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
  - Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
  - Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with microbiology and bacteriology to their definitions.

- Discuss terms associated with microbiology and bacteriology.
- Have students play reinforcement games and work crossword puzzles using terms.

Objective 2: Select from a list vital functions of living organisms.

- Have students list characteristics of a variety of plants and animals (including humans) that illustrate vital functions of living organisms.
- Have students discuss why each of these functions is vital.

Objective 3: Name the five factors that influence the growth of microorganisms.

- Have student discuss the effect of each of these on common microbes, such as mold around the bathtub or mushrooms in their backyard.
- Have students discuss the role of controlling these factors in food preservation.

Objective 4: Match classes of microorganisms to their descriptions.

- Have students list differences between each group.
- Have students collect pictures or examples of microbes and determine which sub-group they belong in.
- Have students examine the prepared slides.

Objective 5: Distinguish among diseases caused by protozoa, fungi, and rickettsiae.

Objective 6: Select from a list diseases caused by viruses.

- Have students list five to seven diseases not found in these lists and research their causes.
- Have students list all the diseases in these objectives that someone they know has had. Have the student identify what type of organism caused the disease.

Objective 7: List the four basic types of parasitic helminths (worms) that can infect the human body.

- Show students a variety of helminths. Have the students determine which type of helminth each is.
- Allow students to view a variety of helminths through a microscope.

Objective 8: Label forms and types of bacteria.

- Have students view bacteria through a microscope and draw what they see.
- Have students draw several imaginary bacteria and then classify them according to shape. For example, the Oscar Meyer bacteria is probably rod shaped.

Objective 9: Distinguish among specialized structures of bacteria.

- Have students discuss examples of spores, capsules, and flagella in science fiction books, movies, or television shows. Are their uses similar?
- Discuss phagocytosis.

Objective 10: Define endotoxins and exotoxins.

- Have students suggest other illustrations for endotoxins and exotoxins, such as anger or limburger cheese in the refrigerator.

Objective 11: Complete statements about growth factors that influence pathogens.

- Have students compare pathogen growth factors to microorganism growth factors.
- Have students suggest agents or processes that kill pathogens and illustrate the use of each factor.
- Students may need to review the pH scale. Explain that the scale ranges from 1-14, with 7 representing a neutral environment, 1 representing the most acid; 14 the most alkaline.

Objective 12: Determine how organisms are spread.

- Use Glow Germ to demonstrate how germs are spread.
- Discuss how students can prevent spread at home, school, and work.
- Show students Transparency Master 8 and 9.

APPLICATION

Objective 13: Evaluate community resources that protect against harmful microorganisms.

- Have students complete the Assignment Sheet. Have each student contact one local resource in person or by phone. Stress variety in resource functions.
- You may want to provide a test for your area.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Curriculum and Instructional Materials Center.* Oklahoma Department of Vocational and Technical Education, 1500 West Seventh Avenue, Stillwater, Oklahoma 74074. Out-of-state teachers must order these films from the *Infection Control Series* offered by Concept Media, P.O. Box 19542, Irvine, California 92714.

  Principles and Guidelines for Hospital Employees, 1986. Covers preventing transmission of pathogens, personal hygiene habits, handwashing, and related medical procedures. (22 minutes, color, VHS)

  An Update for the Health Professional, 1986. Covers newest preventative measures on infection control. Includes AIDS, dressings, and handwashing. (27 minutes. color,VHS)

  AIDS: Infection Control, 1986. Covers medical care techniques to prevent the AIDS infections. (25 minutes, color, VHS)

  The Bacteriology and Serology Labs, Bergwell Productions, Inc., P.O. Box 238, Garden City, New York 11520-0238, 1-800-645-3565.

  Lyme Disease: What You Need to Know. Covers recognizing the deer tick, tick removal, protection, and symptoms. (15 minutes)

- *Human Relations Media.* 175 Tompkins Avenue, Pleasantville, New York 10570-9973, 1-800-431-2050.

  Viruses: The Mysterious Enemy. Discusses viruses and research into them. (2 part filmstrip or VHS)

  Bacteria: Invisible Friends and Foes. Discusses the impact of bacteria, both beneficially and as a disease-causing agent. (3-part filmstrip or VHS)

Print Media

- Flaskerud, Jacquely Haak. *AIDS/HIV Infection: A Reference Guide for Nursing Professionals.* Nurses Book Society: Delran, New Jersey.
- Kirkia, E. Jacquelyn and Marya Grier. *Nurse's Guide to Infection Control.* Nurse's Book Society: Delran, New Jersey.

UNIT RESOURCES

- Duncan, Betty. *Allied Health Careers Instructional Workbook.* Oklahoma Department of Vocational and Technical Education, Curriculum and Instructional Materials Center: Stillwater, Oklahoma, 1987.
- Hartman, Danene and Mary Kellum. *Introduction to Surgical Technology, Microbiology, and Pharmacology.* Mid-America Vocational Curriculum Consortium, Inc.: Stillwater, Oklahoma, 1984.
- Sloan, Kathleen B., Kathryn Persson, and S. Kathleen Moore. *Mosby's Anatomy and Physiology Laboratory Manual.* The C.V. Mosby, Co.: St. Louis, 1990.

MICROBIOLOGY AND BACTERIOLOGY

OBJECTIVE 1

Match terms associated with microbiology and bacteriology to their definitions.

- **antibiosis** – association in which one species of microorganism prevents growth or destroys another species
- **bacteriology** – the study of bacteria
- **chlorophyll** – the green substance in plants that manufactures carbohydrates to use for energy
- **microbiology** – the study of microorganisms
- **microorganisms** – tiny, living plants and animals of varying sizes and shapes that cannot be seen without a microscope; microbes
- **optimum** – the condition most favorable for growth or activity
- **parasite** – an organism that lives within, upon, or at the expense of another living organism called the host
- **pathogen** – a microorganism capable of causing a disease

  NOTE: The adjective form of "pathogen" is "pathogenic."

- **pathology** – the study of the nature and cause of disease which involves changes in structure and function
- **phagocytosis** – engulfment of bacteria by white blood cells
- **saprophyte** – an organism that lives on dead or decaying matter
- **symbiosis** – the ability of different microbe species to live together
- **toxin** – poisonous substance produced by some bacteria
- **ultraviolet rays** – light waves that cause tanning of the skin, production of Vitamin D, and destruction of some organisms

OBJECTIVE 2

Select from a list vital functions of living organisms.

Each individual microorganism is able to carry out some or all of the six vital functions characteristic of living organisms.

- Metabolism
  - Physical processes involved in maintaining life
  - Chemical processes involved in maintaining life
- Growth
- Reproduction
- Irritability (reaction to environment)
- Motion
- Protection

OBJECTIVE 3

Name the five factors that influence the growth of microorganisms.

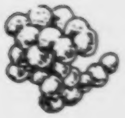
The growth of microorganisms can be affected by any or all of five factors.

- Light exposure
  - Amount of light
  - Type of light
- Temperature
- Moisture
- Food availability
- Oxygen supply

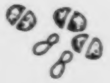
OBJECTIVE 4

Match classes of microorganisms to their descriptions.

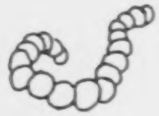
- **bacteria**
  - One-celled microorganisms
  - Usually do not contain chlorophyll
  - May take on various forms
  - May be pathogenic or non-pathogenic



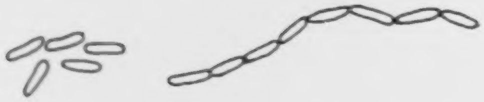
Staphylocci



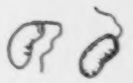
Diplococci



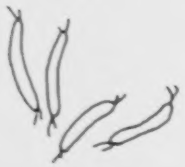
Streptococci



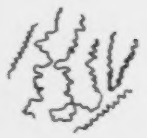
Bacilli (in Chains)



Vibrios



Spirilla

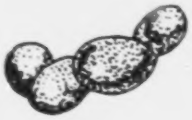


Spirochetes

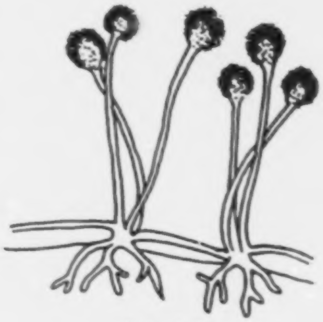
- **fungi**

  NOTE: Yeasts have one cell; molds have more.

  - Are parasites or saprophytes
  - Are plant-like organisms such as mold or yeast
  - Do not have chlorophyll

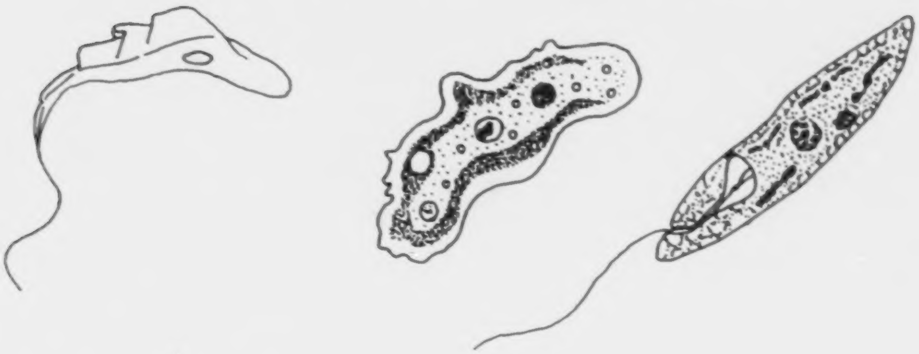


Yeast Cells

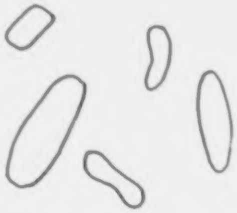


Molds

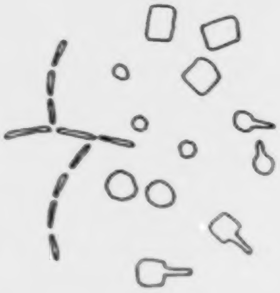
- **protozoa**
  - One-celled animals
  - The simplest form of animal life
  - May reproduce sexually or asexually
  - Capable of movement by a variety of means



- **rickettsiae** (Ruh-KET-see-eye)
  - Organisms smaller than bacteria but larger than virus
  - Grow only within the cells of the living host



- **viruses**
  - Cannot grow or reproduce until they have taken over a living cell
  - Smallest know pathogen



- **helminths** (Metazoa)

  NOTE: See Objective 7.

  - Multi-celled animals
  - Cells form tissues

157

OBJECTIVE 5

Distinguish among diseases caused by protozoa, fungi, and rickettsiae.

Diseases caused by protozoa

- Amoebic dysentery
- Malaria
- Sleeping sickness
- Trichomonas

  NOTE: This organism may cause vaginitis.

Diseases caused by fungi

- Molds
  - Ringworm (tinea capitis)
  - Athlete's foot (epidermophytosis)
- Yeasts
  - Thrush
  - Vaginitis (monilia or candida infections)

Diseases caused by rickettsiae

- Rocky Mountain spotted fever
- Typhus

OBJECTIVE 6

Select from a list diseases caused by viruses.

NOTE: Many diseases are caused by viruses. Some diseases, such as anemia, may be secondary reactions to viruses. Some of the most common virus-caused diseases are listed here.

- Smallpox (variola)
- Chickenpox (varicella)
- Measles (rubeola)
- German measles (rubella)
- Influenza
- Infantile paralysis (poliomyelitis)

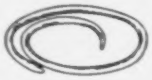
- Mumps (espidemic parotitis)
- Common cold (coryza)
- Fever blisters
- Shingles (herpes zoster)
- Rabies
- Hepatitis

OBJECTIVE 7

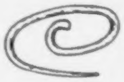
List the four basic types of parasitic helminths (worms) that can infect the human body.

- **roundworm**

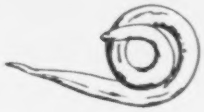
  EXAMPLE: Trichinella, a common parasite transmitted through undercooked pork and rabbit meat, is a roundworm.



- **pinworm**

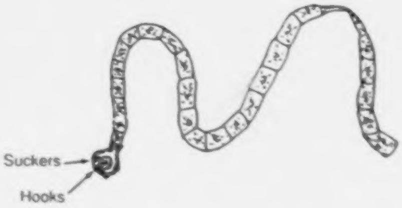


- **hookworm**



- **flatworm**

  EXAMPLE: The tapeworm, a human and animal intestinal parasite, is a flatworm.



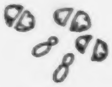
OBJECTIVE 8

Label forms and types of bacteria.

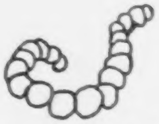
Bacteria are separated into three distinct groups, based on the shape of the organism.

- **spherical or round bacteria (coccus or cocci)**

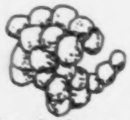
1. Coccus



2. Diplococci (in pairs)



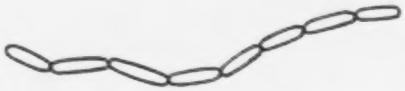
3. Streptococci (in chains)

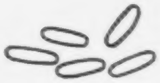


4. Staphylococci (in clusters)

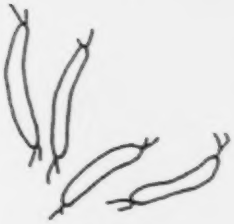
- **rod- or cylinder-shaped (bacilli)**

  NOTE: Bacilli may have rounded, concave, or pointed ends.

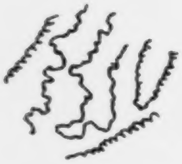




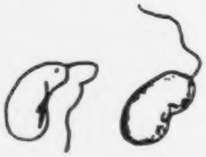
- **spiral or curved**



1. Spirilla



2. Spirochetes

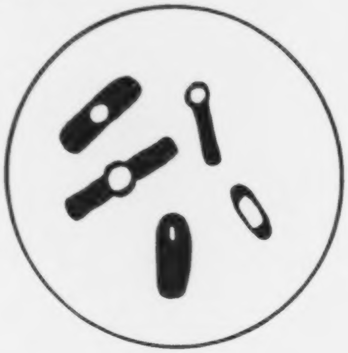


3. Vibrios

OBJECTIVE 9 **Distinguish among specialized structures of bacteria.**

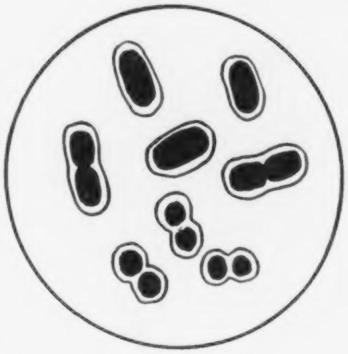
Three specialized structures of bacteria protect the organism or help it move. These structures also aid in identification

- **spores** – a cell for reproduction formed by some plants and protozoa



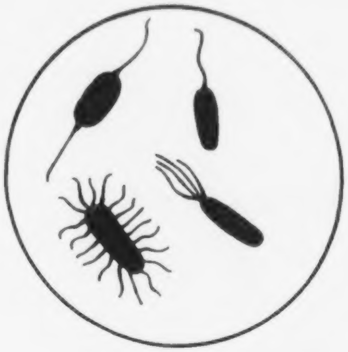
  - Produced by some forms of bacilli, with each bacillus forming one spore
  - Are inactive, dormant forms
  - Resist drying, boiling, and most chemical disinfectants
  - Include the organisms which cause anthrax, botulism, tetanus, and gas gangrene

- **capsules** - a structure or shield surrounding a cell



  - Surround most bacterial cells
  - Difficult to kill because membrane is tough
  - Increase infectiousness of the bacteria
  - Interfere with phagocytosis

- **flagella** - hair-like projections from bacterial bodies

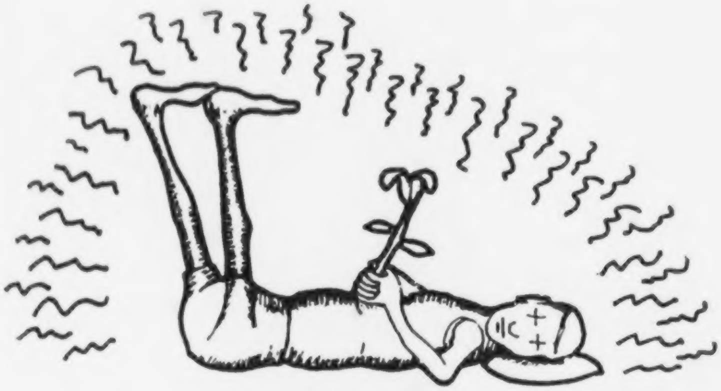


  - Give bacteria the ability to move
  - Present in about half the rod forms and all spirilla forms; not present in the coccal forms

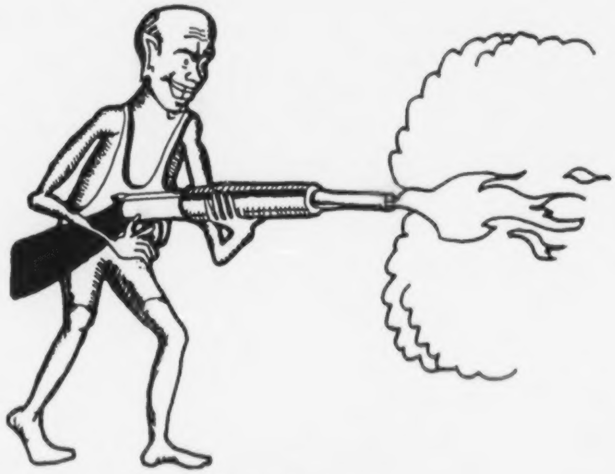
OBJECTIVE 10

Define endotoxins and exotoxins.

- **endotoxins**
  - Poison remains within the cell until it disintegrates.
  - It may cause typhoid fever and bacillary dysentery.
- **exotoxins**
  - Poison is excreted by the cell into its surrounding medium.
  - It may cause tetanus, gas gangrene, diphtheria, and scarlet fever.



Endotoxin



Exotoxin

OBJECTIVE 11 **Complete statements about growth factors that influence pathogens.**

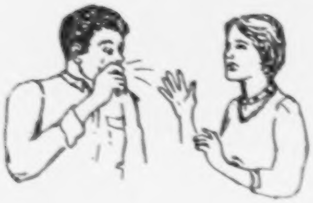
Pathogen growth is affected by seven factors.

- **Moisture**
  - Most bacteria require moisture to grow.
  - Drying kills some bacteria.
  - Some organisms can withstand drying and activate later.
- **Food supply**
  - All pathogens require organic matter for vitamins and cell elements.
  - Pathogens are either saprophytes or parasites.
- **Oxygen**
  - Some require oxygen (aerobes) and others grow without oxygen (anaerobes).
- **Temperature**
  - Heat will destroy most bacteria.
  - Freezing may destroy bacteria, or it may only reduce their activity.
- **pH**
  - Most bacteria grow best in a neutral or slightly alkaline environment; acids and alkalies are harmful to most bacteria.
- **Light**
  - Sunlight kills most bacteria, but stimulates spore formation.
- **Neighboring microorganisms**
  - Some bacteria are independent; others depend on their surrounding microorganisms (symbiosis).

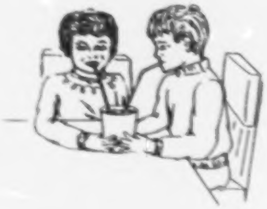
OBJECTIVE 12 **Determine how organisms are spread.**

- **Direct (person to person)**
  - Spread can occur from worker to worker, from worker to patient, or from patient to patient.
  - Organism enters the body through mouth, air particles, and skin contact.

    NOTE: Washing hands frequently and properly and covering the face when coughing or sneezing are the most important methods of preventing person-to-person spread.



(Person sneezing)



(Two people sharing a coke)

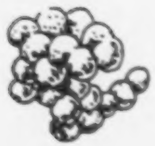
(Shaking hands)

- **Indirect (person to contaminated object to person)**
  - Spread can occur when one object is used by several people.

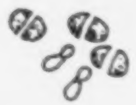
    EXAMPLE: Doorknobs, faucets, and telephones.
  - Spread can occur when cleaning, disinfection, or sterilization are not performed properly.

    NOTE: When in doubt about the possible contamination of a piece of equipment, do not use it.

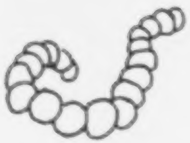
Bacteria



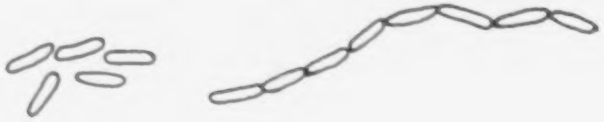
Staphylocci



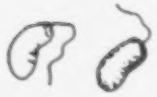
Diplococci



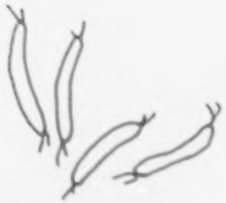
Streptococci



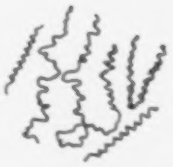
Bacilli (in Chains)



Vibrios



Spirilla

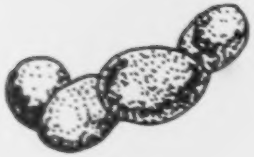


Spirochetes

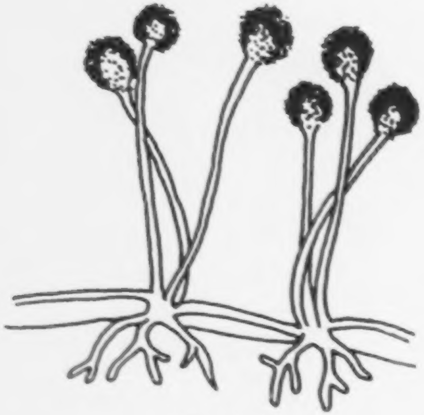
TRANSPARENCY MASTER 1 - Body Structure and Function
CIMC - III - 23

TM 1

Fungi

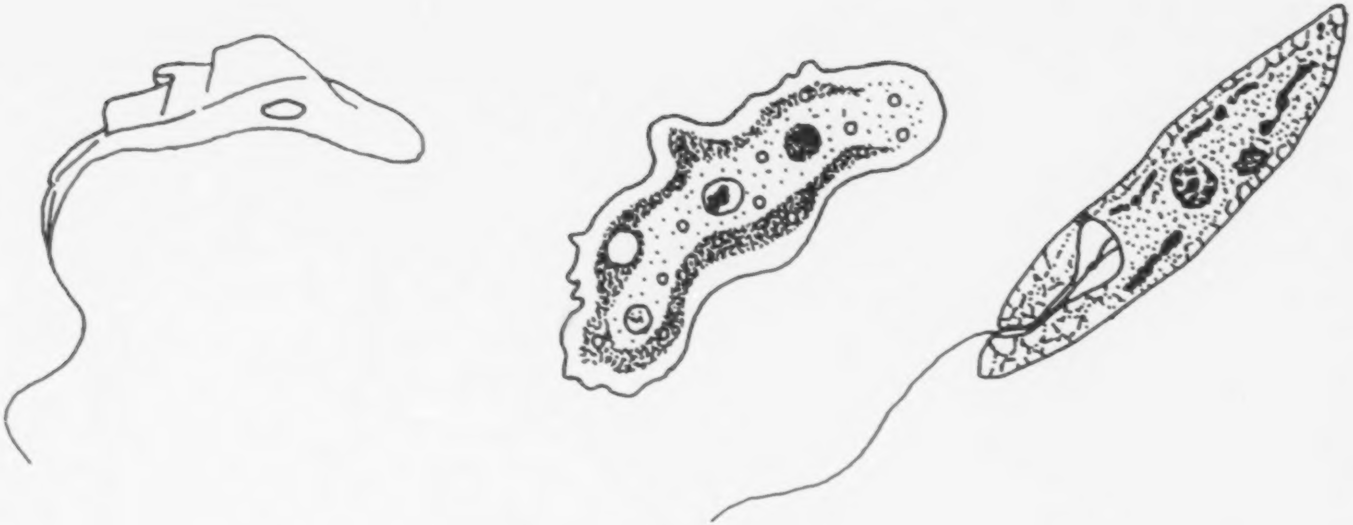


Yeast Cells



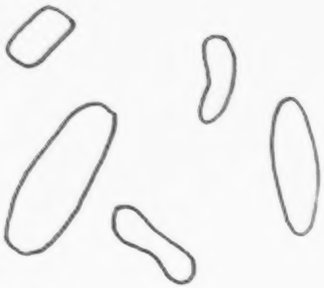
Molds

Protozoa

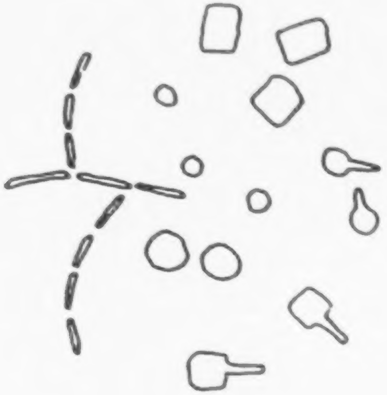


Rickettsiae and Viruses

(As Seen Under an Electron Microscope)



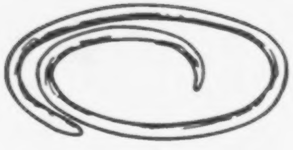
Rickettsiae



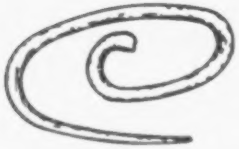
Viruses

Metazoa

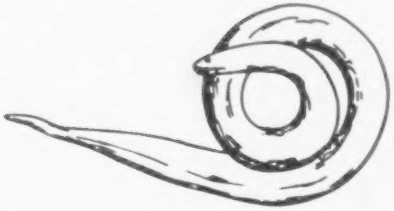
(Helminths)



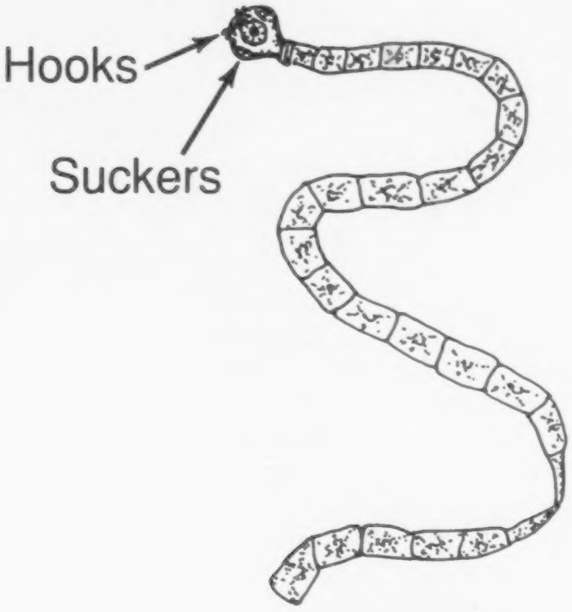
Roundworm



Pinworm



Hookworm

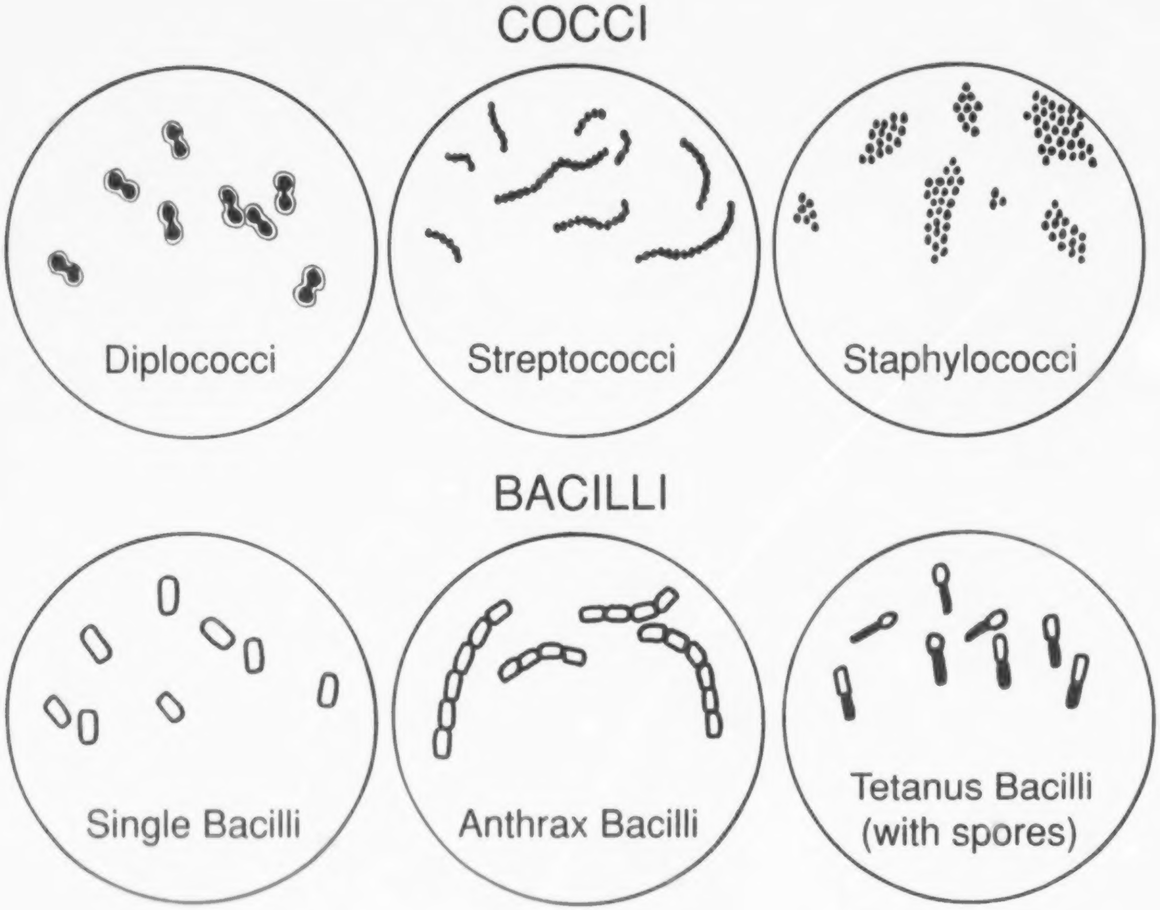


Flatworm

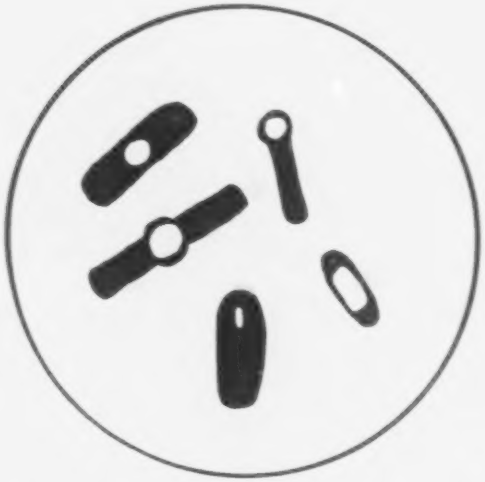
TRANSPARENCY MASTER 5 - Body Structure and Function
CIMC - III - 31

TM 5

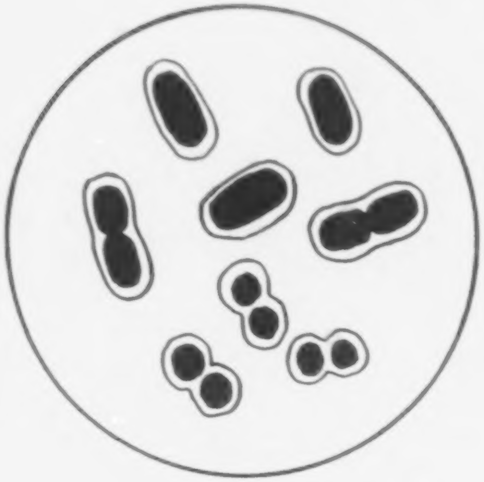
Cocci and Bacilli


COCCI
Diplococci
Streptococci
Staphylococci
BACILLI
Single Bacilli
Anthrax Bacilli
Tetanus Bacilli
(with spores)

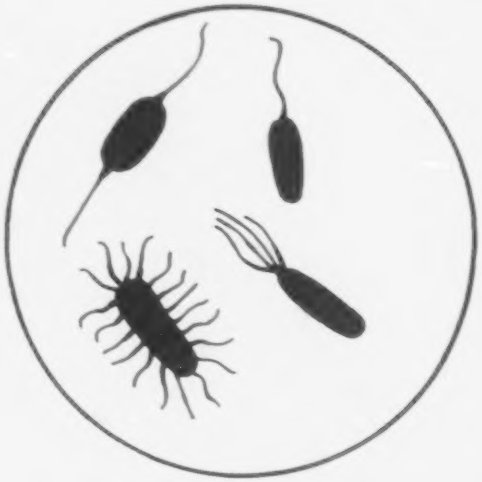
Specialized Structures of Bacteria



Spores
(white structures)



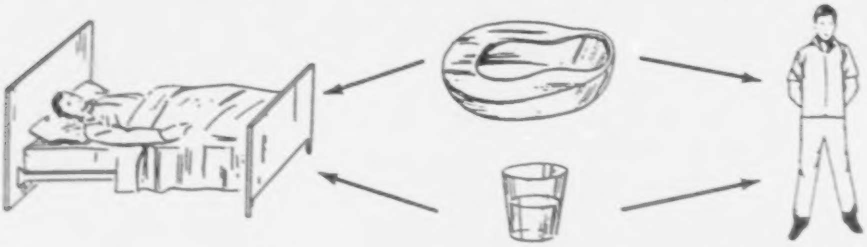
Bacteria
with Capsules



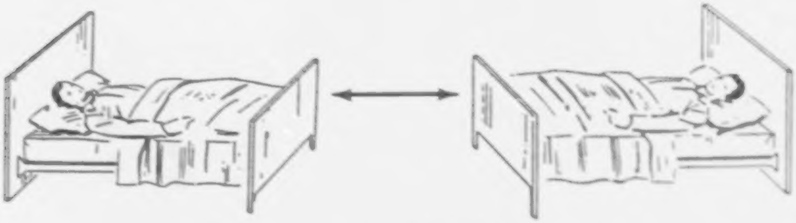
Flagella

TRANSPARENCY MASTER 7 - Body Structure and Function
CIMC - III - 35

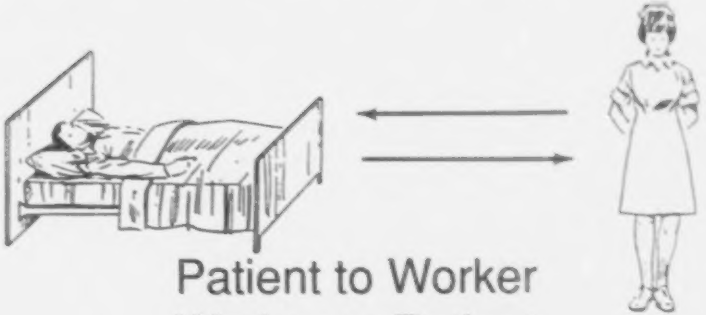
Ways Organisms Are Spread



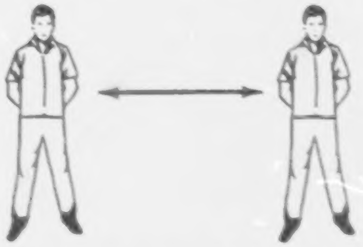
Hospital Equipment to Patient or Worker



Patient to Patient

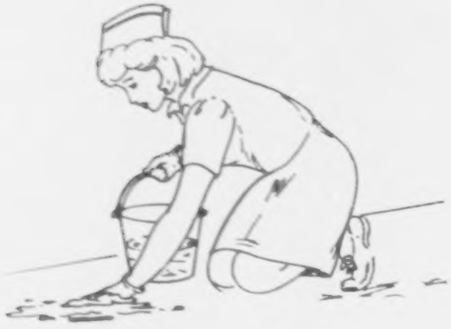


Patient to Worker
Worker to Patient

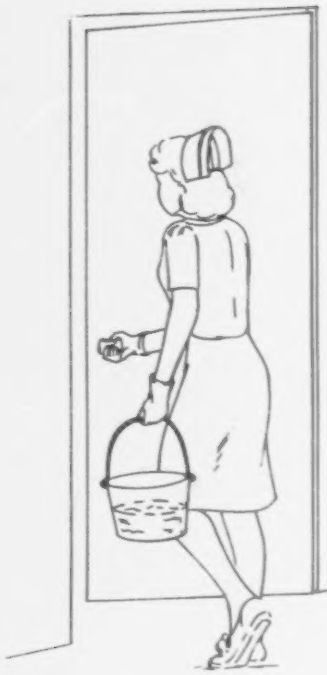


Worker to Worker

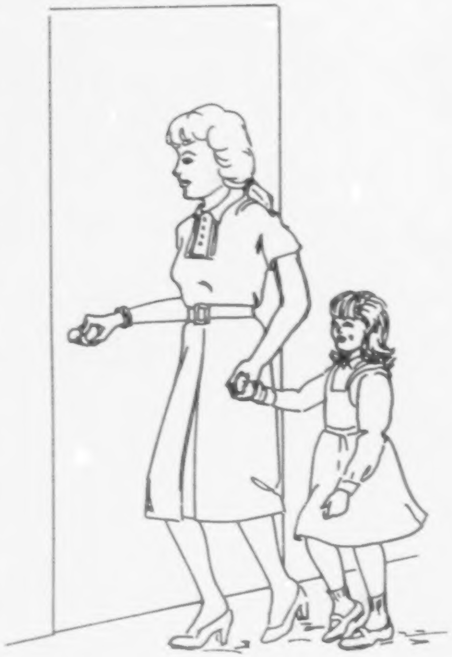
TRANSPARENCY MASTER 9 - Body Structure and Function
CIMC · III · 39



Nurse wearing a glove wipes up a spill.



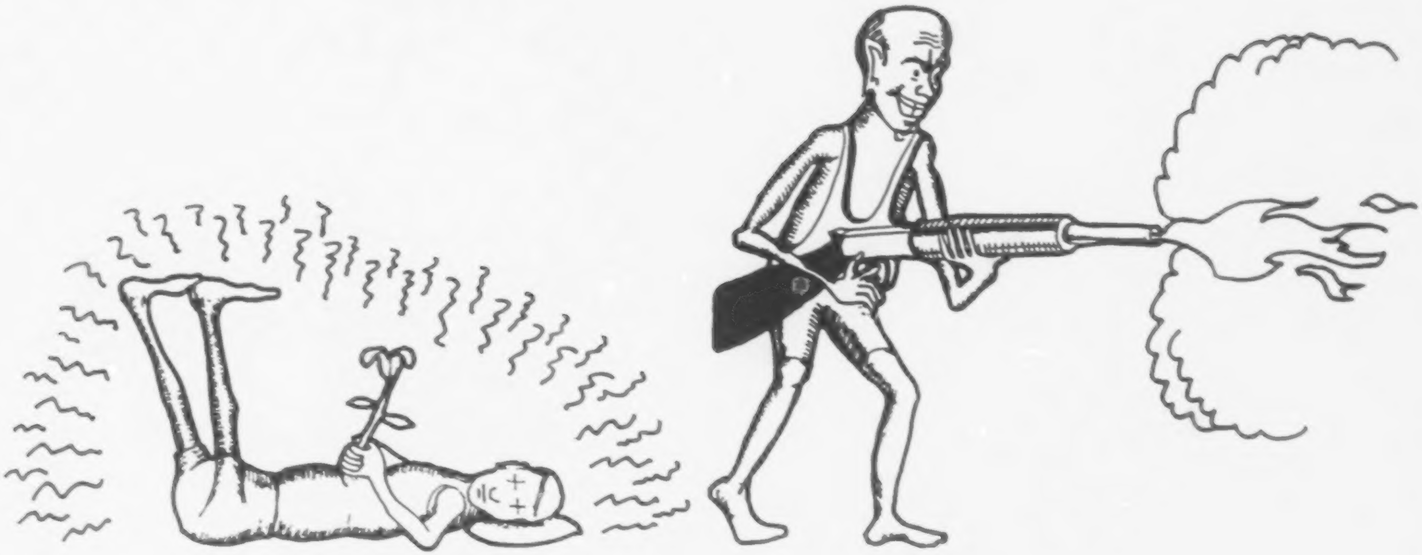
Then she opens the door with the glove



Then a visitor opens the same door

TM 9

Toxins


Endotoxin
Exotoxin

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS

- Introduce the assignment to the students by discussing why oral communication skills and creative/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  – Complete forms and records

  ORAL COMMUNICATIONS SKILLS

  – Apply questioning techniques

  – Conduct/receive interviews

- If students have difficulty completing forms and records:

  – Remind them first to decide what information is being asked for. This saves time by identifying the information they need to know–they won't waste time on unwanted or needed information.

  – Tell them to plan their responses carefully before putting them in final form. If the responses call for sentence or paragraph information, it is always a good idea to write the response in rough draft form, edit it, proofread it, and then rewrite it in its final form.

- If students have difficulty applying questioning techniques:

  – Remind them to plan in advance what they want to ask during the interview by deciding what they need to learn from the interview.

  – Explain that it is always a good idea to have a written list of the questions they want to ask so that no important questions are omitted.

- If students have difficulty conducting interviews:
  - Remind them to either record the interview or take notes instead of relying on their memories.
  - Discuss with them the importance of being prepared when they go to interview someone. Suggest that they always take a written list of questions that they want to ask.
  - Also, remind them to thank the person for taking the time to talk to them.
  - For additional suggestions, see the section on questioning techniques.

ASSIGNMENT SHEET

MICROBIOLOGY AND BACTERIOLOGY

III

Name ______________________ Score __________

OBJECTIVE 13

Evaluate community resources that protect against harmful microorganisms.

INTRODUCTION

Each community must take definite measures to protect citizens from harmful diseases caused by microorganisms that are out of control. Water treatment and waste disposal plants, restaurants, and public facilities must meet standards and pass inspections.

DIRECTIONS

With your class, list public or government agencies that protect against harmful microorganisms in your area. Each student will be responsible for one agency. Contact the agency and ask for a description of its purpose and functions, address, and telephone number.

Report back to class. Include in your report the name of the agency, its function, how its operations are funded, and a list of specific tasks that help protect the community. Use the form on the next page to compile a master list that includes the information from everyone in the class. Suggestions include the division of your state Department of Health, County Health Department, Sanitation Department, Environmental Protection Agency, Food and Drug Administration, and the Animal Control Department.

Functional Writing Skills
- Complete forms & records

Interactive Communication Skills
- Apply questioning techniques
- Conduct/receive interviews

187

ORGANIZATION	ADDRESS AND PHONE	FUNCTION AND FUNDING	TASKS	STUDENT

Check that the following are included in the group's master list:

1. At least six local resources are identified.
2. Information is correct.
3. The chart is completed without omissions.
4. A variety of resources are represented.

WRITTEN
TEST

MICROBIOLOGY AND BACTERIOLOGY

III

Name ______________________________ Score __________

OBJECTIVE 1

Match terms associated with microbiology and bacteriology to their definitions. Write the correct letter in the blank.

Part I

_____ 1. Association in which one species of microorganism prevents growth or destroys another species

_____ 2. The green substance in plants that manufactures carbohydrates to use for energy

_____ 3. The condition most favorable for growth or activity

_____ 4. Engulfment of bacteria by white blood cells

_____ 5. The study of bacteria

_____ 6. An organism that lives on dead or decaying matter

_____ 7. A microorganism capable of causing a disease

a. antibiosis
b. bacteriology
c. chlorophyll
d. microorganisms
e. optimum
f. parasite
g. pathogen
h. phagocytosis
i. saprophyte
j. toxin

May be photocopied for student use.

Part II

_____ 1. Tiny, living plants and animals of varying sizes and shapes that cannot be seen without a microscope; microbes

_____ 2. The ability of different microbe species to live together

_____ 3. The study of microorganisms

_____ 4. An organism that lives within, upon, or at the expense of another living organism called the host

_____ 5. The study of the nature and cause of disease which involves changes in structure and function

_____ 6. Poisonous substance produced by some bacteria

_____ 7. Light waves that cause tanning of the skin, production of Vitamin D, and destruction of some organisms

a. antibiosis
b. bacteriology
c. microbiology
d. microorganisms
e. parasite
f. pathology
g. saprophyte
h. symbiosis
i. toxin
j. ultraviolet rays

OBJECTIVE 2 **Select from a list vital functions of living organisms.** Write and "X" in the blank before each vital function.

_____ 1. Motion

_____ 2. Gender differences

_____ 3. Reproduction

_____ 4. Irritability

_____ 5. Growth

_____ 6. Breathing

May be photocopied for student use.

_____ 7. Circulation

_____ 8. Metabolism

_____ 9. Protection

OBJECTIVE 3

Name the five factors that influence the growth of microorganisms. Write your answers on the lines provided.

____

____

____

____

____

OBJECTIVE 4

Match classes of microorganisms to their descriptions. Write the correct letters in the blanks.

_____ 1. Plant-like organisms that include molds and yeasts, have no chlorophyll, and are parasites or saprophytes

_____ 2. One-celled microorganisms that may take on various forms; usually have no chlorophyll, and may or may not be pathogenic

_____ 3. Organisms that are smaller than bacteria but larger than viruses and that only grow within the cell of a living host

_____ 4. One-celled animals capable of movement by a variety of means that are the simplest form of animal life and may reproduce sexually or asexually

a. bacteria
b. fungi
c. germ
d. helminths
e. microbe
f. protista
g. protozoa
h. rickettsiae
i. viruses

May be photocopied for student use.

_____ 5. Organisms which cannot grow or reproduce until they have taken over a living cell; the smallest know pathogen

_____ 6. Multicellular animals whose cells become differentiated to form tissues

OBJECTIVE 5

Distinguish among diseases caused by protozoa, fungi, and rickettsiae. Write a "P" in the blank before diseases caused by protozoa, and "F" before fungi, and "R" before rickettsiae.

_____ 1. Trichomonas

_____ 2. Thrush

_____ 3. Ringworm

_____ 4. Typhus

_____ 5. Amoebic dysentery

_____ 6. Vaginitis

_____ 7. Sleeping sickness

_____ 8. Malaria

_____ 9. Rocky Mountain spotted fever

_____ 10. Athlete's foot

OBJECTIVE 6

Select from a list diseases caused by viruses. Write an "X" in the blank before each disease caused by a virus.

_____ 1. Cholecystitis

_____ 2. Chickenpox

_____ 3. Common cold

_____ 4. Psoriasis

_____ 5. Infantile paralysis

_____ 6. Allergies

May be photocopied for student use.

_____ 7. Shingles

_____ 8. Influenza

_____ 9. Epilepsy

_____ 10. Rabies

_____ 11. Athlete's foot

OBJECTIVE 7

List the four basic types of parasitic helminths (worms) that can infect the human body.

____

____

____

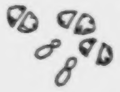
____

OBJECTIVE 8

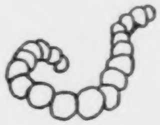
Label forms and types of bacteria. Write the form and type of bacteria in the blanks.

1. **Form:** ____

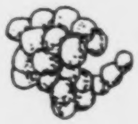
a. ____________________



b. ____________________



c. ____________________

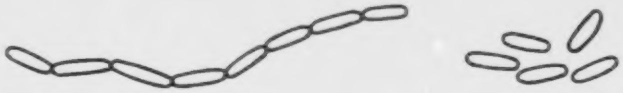


c. ____________________

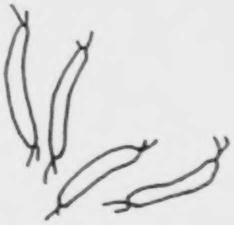
May be photocopied for student use.

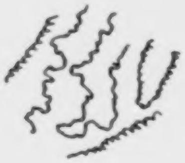
BEST COPY AVAILABLE

2. **Form:** ______________________________

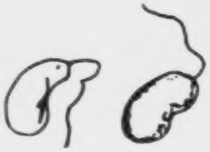


3. **Form:** ______________________________





a. ____________________ b. ____________________



c. ____________________

OBJECTIVE 9

Distinguish among specialized structures of bacteria. Write an "S" in the blanks before characteristics of spores, a "C" before capsules, and an "F" before flagella.

_____ 1. Give bacteria ability to move

_____ 2. Surround most bacterial cells

May be photocopied for student use.

_____ 3. Resist drying, boiling, and most chemical disinfectants

_____ 4. Produced by some forms of bacilli; each bacillus forms one spore

_____ 5. Interfere with phagocytosis

_____ 6. Include the organisms which causes anthrax, botulism, tetanus, and gas gangrene

_____ 7. Present in about half of the rod forms and all spirilla forms; not present in the coccal forms

_____ 8. Are inactive, dormant forms

_____ 9. Increase infectiousness of bacteria

_____ 10. A cell for reproduction formed by some plants and protozoa

_____ 11. A structure or shield surrounding a cell

_____ 12. Hair-like projections from bacterial bodies

OBJECTIVE 10 **Define endotoxins and exotoxins.**

Endotoxins: ____

____

Exotoxins: ____

____

OBJECTIVE 11 **Complete statements about growth factors that influence pathogens.**

_____ 1. Pathogens can be

- a. parasites only
- b. saprophytes only
- c. parasites or saprophytes
- d. leukocytes

May be photocopied for student use.

_____ 2. Freezing may

a. destroy most bacteria

b. encourage rapid bacterial growth

c. only reduce bacterial activity

d. have no effect on bacterial growth

_____ 3. Sunlight kills most bacteria, but it also stimulates

a. spore formation

b. encapsulation

c. flagella growth

d. mutations

_____ 4. Oxygen is

a. always required by pathogens

b. sometimes required by pathogens

c. never required by pathogens

d. helpful to growth, whether necessary or not

_____ 5. The environment in which you are most likely to find pathogens is

a. acidic

b. neutral

c. alkaline

d. no one environment is better

May be photocopied for student use.

_____ 6. Pathogen growth is

a. never affected by neighboring microorganisms

b. always affected by neighboring microorganisms

c. sometimes affected by neighboring microorganisms

d. always at the same rate as neighboring microorganisms

OBJECTIVE 12

Determine how organisms are spread. Read each short paragraph, then describe how the spread occurred. Write whether the spread was direct or indirect and how the organisms traveled from one person to another.

1. Ceryl coughed and sneezed as she talked on the telephone. When she completed her conversation, Bill used the same telephone. A week later, he was coughing and sneezing, too.

____

____

____

2. Misa Tibbs had to attend a reception. She took some cough syrup, but was still coughing. She was very careful to turn her head and cover her mouth with her hand, but many people she shook hands with caught her cold.

____

____

3. Little Lisa had a strange rash on her leg. Mom washed the area thoroughly and put an antibiotic on the rash, then threw Lisa's jeans in with a load of washcloths and towels. A few days later, everyone in the family had the same rash.

____

____

May be photocopied for student use.

4. Karen was assisting the dentist she worked for. The patient she was treating had an abscess that had to be lanced. During the process, Karen had trouble locating an instrument. Without removing her rubber gloves, she offered several instruments to the dentist before finding the correct one. Since these instruments were never actually used by the patient, she returned them to their drawers. When a patient treated later that day suffered an infection, the dentist claimed Karen had transmitted it.

    ____

    ____

NOTE: Objective 13 is evaluated on a job sheet/assignment sheet in this unit. If you have not completed this component, see your instructor.

May be photocopied for student use.

OBJECTIVE 1

Part I		Part II	
1.	a	1.	d
2.	c	2.	h
3.	e	3.	c
4.	h	4.	e
5.	b	5.	f
6.	i	6.	i
7.	g	7.	j

OBJECTIVE 2

1, 3, 4, 5, 8, 9

OBJECTIVE 3

Light exposure

Temperature

Moisture

Food availability

Oxygen supply

OBJECTIVE 4

1. b
2. a
3. h
4. g
5. i
6. d

OBJECTIVE 5

1. P
2. F
3. F
4. R
5. P
6. F
7. P
8. P
9. R
10. F

OBJECTIVE 6

2, 3, 5, 7, 8, 10

OBJECTIVE 7

Roundworm

Pinworm

Hookworm

Flatworm

OBJECTIVE 8

1. Spherical or round bacteria (coccus or cocci)
   a. Coccus
   b. Diplococci (in pairs)
   c. Streptococci (in chains)
   d. Staphylococci (in clusters)
2. Bacilli (rod or cylinder shapes)
3. Spiral or curved forms
   a. Spirilla
   b. Spirochetes
   c. Vibrios

OBJECTIVE 9

1. F
2. C
3. S
4. S
5. C
6. S
7. F
8. S
9. C
10. S
11. C
12. F

OBJECTIVE 10

Descriptions should include:

a. Poison remains within the cell until it disintegrates

b. Poison is excreted by the cell into the surrounding medium

OBJECTIVE 11

1. c
2. c
3. a
4. b
5. b
6. c

OBJECTIVE 12

1. Indirect - Ceryl coughed on the telephone. When Bill used the same phone, the organism spread to him.
2. Direct - Misa Tibbs spread the organism through the air and by covering her mouth then shaking hands.
3. Indirect - The organism was spread from Lisa's clothing to other laundry as it was washed.
4. Indirect - The organism was spread from the patient to Karen as she assisted the dentist, then from Karen to the instruments. When the unsterilized instruments were used again, the organism was spread to later patients.

OBJECTIVE SHEET

THE INTEGUMENTARY SYSTEM

IV

INTRODUCTION

The largest system of the body is the integumentary system, or the skin. Integument covers the body and lines vessels and cavities. It is the first line of defense of the human body, houses the nerves that help us interact with our environment, and, with the excretory system, regulates body temperature through perspiration. The appearance of a patient's skin is an important indicator of many disorders. Skin problems can be caused by injury, infection, irritation, or age.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify characteristics and functions of the skin and its parts and layers. The student will also be familiar with techniques which promote the healthy functioning of the integumentary system. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVE

After completing this unit, the student will be able to:

1. Match terms associated with the integumentary system to their definitions.
2. Distinguish among characteristics of the layers of skin.
3. Choose the word or phrase that completes statements about skin appendages and their functions.
4. State functions of the skin.
5. Select from a list characteristics of healthy skin.
6. Choose the word or phrase that completes statements about skin changes during aging.
7. Communicate about the integumentary system. (Assignment Sheet)

THE INTEGUMENTARY SYSTEM

PREPARATION

- Order materials to supplement unit.
- Request brochures and promotional materials from pharmaceutical companies.
- Invite a dermatologist to speak to class about the importance of the proper care of skin.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. Confirm the scheduled appearance 2-3 days prior to the presentation.
- Obtain models and large pictures of integumentary system. Models may be ordered from Health Edco, P.O. Box 21207, Waco, TX 76702-9964.
- Make a poster of the integumentary system.
- Make a bulletin board showing parts of integumentary system.
- Devise games and/or crossword puzzles to reinforce terms, groupings, etc.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.
  - Assist students in scheduling and presenting prepared and extemporaneous speeches.
  - Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.

- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.

- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the integumentary system to their definitions.

- Discuss terms associated with the integumentary system.
- Have students play reinforcement games and work crossword puzzles using terms.
- Have students list words they associate with skin.

Objective 2: Distinguish among characteristics of the layers of skin.

- Discuss the layers of skin.
- Display pictures or models which show the layers of skin.
- Compare layers of skin to good visual examples: layered clothing for warmth, snakes shedding skin, layers of leaves, sandwiches, etc.

Objective 3: Choose the word or phrase that completes statements about skin appendages and their functions.

- Discuss principal functions of skin appendages.
- Discuss care of appendages.
- Discuss common health problems of each appendage.

Objective 4: State functions of the skin.

- Discuss the parts of the skin.
- Display pictures or models showing parts of skin.
- Discuss the functions of the skin.
- Relate structures and functions.
- Review how the skin interacts with other systems.

Objective 5: Select from a list characteristics of healthy skin.

- Discuss characteristics of healthy skin.
- Discuss methods of maintaining healthy skin.
- Discuss how social opinions of healthy skin have varied. For example, women once strived for very pale skin, then for very dark skin.
- Invite a beauty school instructor to discuss healthy maintenance of hair and nails.
- Discuss health problems caused by popular fashion. For example, false fingernails trap moisture in and on the true nail and may lead to fungal growths; shaving can irritate and dry skin; tattooing may cause blood poisoning.

Objective 6: Choose the word or phrase that completes statements about skin changes during aging.

- Discuss changes in the skin that take place during the aging process.
- Discuss common skin abnormalities.
- Discuss skin assessment and its importance in the nursing process.
- Discuss other age-related skin problems such as diaper-rash, acne, age spots, etc.
- Discuss bruising, how it is caused, and bruising patterns a nurse should be familiar with, such as the forehead of a toddler, bruising indicating abuse, etc.

APPLICATION

Objective 7: Communicate about the integumentary system.

- Have students complete Assignment Sheet 1. Allow students to be creative in their application. Suggestions could include the following:
  - Using sign language to give a presentation on preventing damage to skin.
  - Writing and presenting a short skit about healthy skin to local elementary school.
  - Preparing a brochure or tape on aging, infant, adolescent, or pregnancy-related skin problems.

  - Writing and presenting a puppet show about the importance of keeping skin healthy.

  - Writing and recording an audio tape about healthy skin.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give written test.

- Evaluate students on assignment sheet activities if not previously completed.

- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- Hole, John W. Slide set to accompany *Human Anatomy and Physiology*, 4th ed. William C. Brown Publishers, Dubuque, Iowa, 1987.

- *I Am Joe's Skin*, Oklahoma Department of Vocational and Technical Education Resource Center, 1500 West Seventh Avenue, Stillwater, OK 74074-4364. Describes the construction, purpose, problems, and care associated with the integumentary system. (26 minutes, color, VHS)

- *Introducing Biology*, a Telecourse, The Coast Community Colleges, Orange County, Calif., 1985.

- *Opportunities for Learning, Inc.*, 841 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700, offers the following.

  Anatomy and Physiology Filmstrips Series: The Skin (Unit 2). (Color filmstrip with cassette and instructor's guide)

  Human Systems Filmstrip Set: Skin or Integumentary System. Film covers special cells, hair, sweat glands, and skin problems. (Filmstrip with cassette and student self-instruction script booklet)

Print Media

- Anthony, Catherine P. and Gary A. Thibodeau. *Textbook of Anatomy and Physiology,* 11th ed. C.V. Mosby Co.: St. Louis, 1983.

- *Health Edco,* P. O. Box 21207, Waco, TX 76702-9964 offers the following:

  The Human Biology Series. Series of color transparency masters covering the integumentary, skeletal, muscular, nervous, circulatory, respiratory, digestive, excretory, and reproductive systems.

  Health Chart Set on Tripod. Thirty-two charts on a tripod. Charts cover the cell, skin, teeth, behavior, emotions, drugs, the senses, nervous system, endocrine system, skeletal system, muscular system, posture, fatigue, exercise, digestion, respiration, circulation, the urinary system, diseases, artificial respiration, radiation, public health, first aid, safety, driver's education, and leading causes of death.

- Hole, John W. *Human Anatomy and Physiology,* 4th ed. Wm. C. Brown Publishers: Dubuque, Iowa, 1987.

- Luciano, Dorothy S., Arthur J. Vander, James H. Sherman. *Human Anatomy and Physiology, Structure and Function,* 2nd ed. McGraw-Hill Book Co.: New York, 1978.

- McClintic, J. Robert. *Basic Anatomy and Physiology of the Human Body.* John Wiley & Sons: New York, 1975.

- *Opportunities for Learning, Inc.*, 841 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700 offers the following:

  Human Body Transparencies. Full color transparencies with overlays illustrating the skin, skeletal system, bone joints, circulatory system , heart, nervous system, respiratory system, digestive system, eye, vision defects, ear, and tooth structure.

  Human Biology Flash Cards. 8.5" X 11" flash cards with identification and body location on the back of each card. Cards cover integumentary, circulatory, respiratory, digestive, excretory, endocrine, nervous, and reproductive systems and cell and tissue structures.

- Tortora, Gerald J. and Nicholas P. Anagnostakos. *Principles of Anatomy and Physiology,* 3rd ed. Harper & Row: New York, 1981.

UNIT REFERENCES

- Anthony, Catherine P. and Gary A. Thibodeau. *Textbook of Anatomy and Physiology*, 11th ed. C.V. Mosby Co.: St. Louis, 1983.
- Hole, John W. *Human Anatomy and Physiology*, 4th ed. Wm. C. Brown Publishers: Dubuque, Iowa, 1987.
- Tortora, Gerald J. and Nicholas P. Anagnostakos. *Principles of Anatomy and Physiology*, 3rd ed. Harper & Row: New York, 1981.

INFORMATION SHEET

THE INTEGUMENTARY SYSTEM IV

OBJECTIVE 1

Match terms associated with the integumentary system to their definitions.

- **appendage** – anything attached to a larger or major part
- **cutaneous** – pertaining to the skin
- **dermatology** – the study of skin diseases
- **dermis** – the inner, sensitive, vascular layer of the skin
- **elasticity** – the ability to stretch and then return to the original shape
- **epidermis** – the outer layer of the skin
- **exfoliation** – sloughing or scaling off of dead tissue
- **horny tissue** – tissue of the outer, scaly, layer of the epidermis
- **integument** – skin including sweat and oil glands
- **keratin** – a very tough protein substance in hair, nails, and horny tissue that makes them waterproof
- **lesion** – circumscribed area of pathologically altered tissue
- **melanin** – the dark brown or black pigment that gives color to hair and skin
- **nevus** – congenital coloration of an area of the skin; birthmark or mole

  NOTE: The plural form of nevus is nevi.
- **purulent** – forming or containing pus
- **regeneration** – repair, regrowth, or restoration of a part
- **sebum** – a fatty, oil secretion of the sebaceous glands
- **squamous** – covered with or consisting of scales
- **suppuration** – process of pus formation

OBJECTIVE 2

Distinguish among characteristics of the layers of skin.

The skin is the largest organ of the body. It protects the body from external agents, including bacteria, viruses, and environmental debris. The skin is continuous with the mucous membrane (which lines cavities that communicate with the exterior) and has a layered structure.

Epidermis

- Is the outer layer of the skin
- Contains no blood, lymph vessels, or nerve endings
- Contains pigment or melanin
- Is made of two layers:

  Stratum corneum (horny layer)

  - Is the outer layer of dead cells
  - Scales off outer-most cells
  - Converts cells to keratin
  - Protects body from invading bacteria
  - Is slightly acidic
  - Varies in thickness

  Stratum germinativum (growing layer)

  - Is the lower layer of epidermis
  - Grows new cells through mitosis
  - Pushes cells into the horny layer to replace scaled off cells

Dermis

- Lies directly beneath the epidermis and is composed of dense, fibrous connective tissue
- Contains blood vessels, nerves, lymph vessels, hair follicles, oil and sweat glands, and fat cells

- Has two layers:

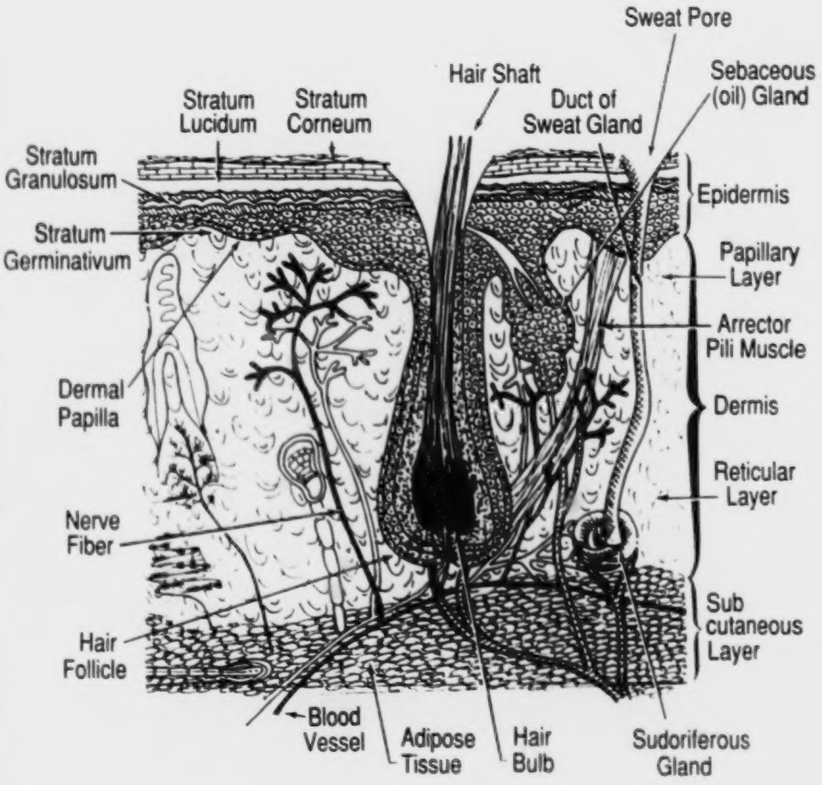
  Papillary layer

  - Lies next to the germinal (basal) layer of the epidermis
  - Produces the ridges of the skin that form finger-prints

  Reticular layer

  - Lies beneath the papillary layer
  - Forms a network of interlacing cells and fibers

Beneath the dermis is a layer of fatty, connective tissue that connects the skin to underlying muscle. This layer, called the subcutaneous layer, is not a part of the skin, but is closely related.


Sweat Pore
Hair Shaft
Sebaceous (oil) Gland
Stratum Lucidum
Stratum Corneum
Duct of Sweat Gland
Stratum Granulosum
Epidermis
Stratum Germinativum
Papillary Layer
Arrector Pili Muscle
Dermal Papilla
Dermis
Reticular Layer
Nerve Fiber
Sub cutaneous Layer
Hair Follicle
Blood Vessel
Adipose Tissue
Hair Bulb
Sudoriferous Gland

BEST COPY AVAILABLE

OBJECTIVE 3

Choose the word or phrase that completes statements about skin appendages and their functions.

Nails

- Are made of epidermal cells that have been converted to keratin and form the horny covering of the nail
- Grow from epithelial cells lying under the white crescent (lunule) at the end of the nail
- Protect the underlying delicate tissues

Hair

- Is found on all parts of the body except the palms of hands, soles of feet, and the penis
- Is made of a bulb, follicle, and shaft. The bulb and follicle are in the dermis; the shaft extends through the epidermis and is the hair we see
- Receives oil from a sebaceous oil gland which is attached to the follicle and secretes oil on each shaft
- "Stands on end" because of an arrector pili muscle attached to the hair bulb
- Is colored by different amounts of pigment within the hair shaft
- Has no apparent function with the exception of hair found around eyes, ears and nose which protects by keeping out dust and insects

Skin glands

- Sebaceous glands
    - Are found in sets of two or more per hair follicle
    - Secrete sebum to lubricate hair
    - Keep skin soft and hair supple
    - Prevent excessive water loss
    - Lessen the amount of heat lost from the skin

- Sweat glands (sudoriferous glands)
  - Are very small and numerous, especially on palms of hands, soles of feet, forehead, and under arms
  - Are located in the dermis and empty through pores in epidermis
  - Help maintain homeostasis of fluids and electrolytes and body temperature
- Ceruminous glands (modified sweat glands)
  - Are located in external ear
  - Secrete cerumen (wax-like substance)

OBJECTIVE 4

State functions of the skin.

- Protects by acting as a mechanical barrier against microorganisms, sunlight, and chemicals
- Senses pain, heat, cold, touch, and pressure through nerve endings in the skin
- Regulates body temperature by varying the amount of blood flowing through the skin and varying the amount of sweat excretion
- Acts as an excretory organ through sweat glands
- Aids in maintaining fluid and electrolyte balance

OBJECTIVE 5

Select from a list characteristics of healthy skin.

Since the skin is an integral part of the human body, its health must be maintained. Some of the characteristics of healthy skin are:

- **Smooth texture** – indicates normal functioning of the sweat and sebaceous glands
- **Good elasticity** – indicates the health of underlying tissues
- **Consistency of color** – is dependent on a healthy diet including appropriate vitamins and the appropriate amount of sunlight
- **Lack of odor** – indicates healthy skin, hygienic practices, and proper diet

NOTE: Disease-free skin has no odor; body odor is related to hygienic practices and diet.

OBJECTIVE 6

Choose the word or phrase that completes statements about skin changes during aging.

- The skin becomes drier as sebaceous glands work less.
- The skin starts to wrinkle as fat deposits beneath the skin are lost.
- There is a loss of elasticity due to changes in the underlying fibrous connective tissues and loss of fat tissues.
- Liver spots form where the skin is most frequently exposed to the ultra-violet rays of the sun.
- Older skin tends to be thinner and more susceptible to irritations, breakdown, and bruising.

COMMON SKIN CONDITIONS

- **acne (pimples)** – infection and inflammation of sebaceous glands
- **boils (furuncles)** – inflammation and infection of the dermis and subcutaneous tissue caused by bacteria entering through hair follicles
- **cellulitis** – inflammation of cellular or connective tissues
- **cyanosis** – bluish-gray color that is best assessed on the skin around the lips, cheeks, and ear lobes
- **decubitus ulcer** – lesion, usually over a bony prominence, caused by local interference of circulation
- **ecchymoses (bruises)** – hemorrhaged areas under the skin
- **edema** – swelling caused by retention of fluid in tissues
- **erythema** – redness of the skin
- **excoriation** – skin abrasion caused by trauma, scraping, or scratching
- **jaundice** – yellowish color in the skin and sclera (white portion of the eye) caused by an excessive amount of bilirubin
- **keloid** – overgrowth of scar tissue
- **macule** – small flat blemish or discoloration that is flush with the skin surface
- **mottling** – spotting with patches of color
- **pallor** – paleness of skin, best assessed in nail beds, lips, and conjunctiva
- **petechia** – tiny purple or red spots that appear on the skin as a result of minute capillary hemorrhage
- **pustule** – an elevation filled with pus
- **tinea** – infectious fungal skin eruption characterized by vesicles
- **urticaria** – wheals or welts that itch intensely and usually have white elevated centers; hives

ASSIGNMENT SHEET

Development of:
READING SKILLS
WRITING SKILLS
ORAL COMMUNICATION SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, employability, and oral communication skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  – Select useful resources

  WRITING SKILLS

  – Take notes

  – Use standard grammar and correct spelling, punctuation, and capitalization

  – State ideas clearly

  ORAL COMMUNICATION SKILLS

  – Use good speaking techniques

  – Make informative presentations

  EMPLOYABILITY SKILLS

  – Developing self confidence/esteem

- If students have difficulty selecting resources:

  – Review with them the different types of resources available to them. Have volunteers tell which type of information can be found in each resource type and what types of projects each resource is helpful with.

  - Help them learn how to locate each resource in libraries, resource centers, or media centers.

- If students have difficulty taking notes:

  - Remind them that they take notes as they read so that when they are ready to prepare the final product, they will have the information they need in an easy to use format. Explain that because the notes they take are for their own use, they should develop their own note-taking style.

  - Have students volunteer to discuss some of their own note-taking tricks and techniques. Suggest that others may wish to experiment with some of these techniques.

  - Remind the students that they should always take notes in their own words instead of copying directly from the original source. This makes it easier when it is time to prepare the final project.

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:
    - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.
    - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).
    - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.
    - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.
- If students have difficulty using good speaking techniques:
    - Remind them to speak clearly; their voices should be loud enough to be heard, but not so loud to be offensive.
    - Suggest that they practice before doing the actual presenting. Practicing in front of a mirror helps many presenters.
    - Discuss with the group the importance of knowing their information so that their speech is smooth, without long pauses or frequent "eh's." Remind them to stress important facts by slowing down or speaking louder. It is also good to repeat or summarize important points.
- If students have difficulty making informative presentations:
    - Remind them to carefully plan what they want to say and how they want to say it. Suggest that they think about the intended audience as they plan.
    - For additional suggestions about making informative presentations, refer to the suggestions for good speaking techniques and stating ideas clearly also found on this Instructional Supplement.

- If students have difficulty developing effective self confidence/esteem:
  - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.
  - Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.
  - Allow the students to work in heterogenous groups to enable the less confident students to learn fron the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE INTEGUMENTARY SYSTEM

IV

Name ______________________________ Score ____________

OBJECTIVE 7

Communicate about the integumentary system.

INTRODUCTION

The skin is the first line of defense for all body systems. Its appearance is a useful tool in assessment. Skin is affected by many diseases and most injuries. Age, diet, hygiene, and lifestyle affect skin. Health care professionals need to be aware of how to take care of this important body covering.

DIRECTIONS

Consult three references to learn more about how to keep the skin healthy. Choose one of the activities below. Check with your instructor for specific instructions or other activities which may be substituted.

- Create a brochure about ways to promote healthy skin. Make copies and distribute to the class.
- Prepare a 10 minute presentation on ways to promote healthy skin. Present it to your class, a community group, or another class in your school. This may be video-taped for playback to other classes.

  NOTE: Be creative. Think of the different ways people like to receive information. If you know sign language, you might use it with your presentation.
- Write and record a 10 minute talk on audio tape.
- Participate in a health/wellness fair and distribute materials or brochures about ways to promote healthy skin.

Reasearch and Reference Skills
- Select useful resources

Languages Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Research Skills
- Take notes

Oral Presentation Skills
- Make informative presentations
- Use good speaking techniques (pitch, volume, rate, inflection)

Job Acquisition/ Development Skills
- Develop self confidence/esteem

ASSIGNMENT SHEET

The score should reflect the amount of research and application by the student, the usefulness of the information presented, and the student's ability to answer questions about the topic he or she has chosen.

WRITTEN TEST

THE INTEGUMENTARY SYSTEM

IV

Name ______________________________ Score ____________

OBJECTIVE 1

Match terms associated with the integumentary system to their correct definitions. Write the letter of the correct answer in the blanks provided.

Part I

_____ 1. Sloughing or scaling off of dead tissue

_____ 2. A very tough protein substance in hair, nails, and horny tissue that makes them waterproof

_____ 3. The dark brown or black pigment that gives color to hair and skin

_____ 4. Process of pus formation

_____ 5. The outer layer of the skin

_____ 6. The study of skin diseases

_____ 7. Anything attached to a larger or major part

_____ 8. Congenital coloration of an area of the skin; birthmark or mole

_____ 9. Tissue of the outer, scaly layer of the epidermis

a. appendage
b. cutaneous
c. dermatology
d. dermis
e. epidermis
f. exfoliation
g. horny tissue
h. keratin
i. melanin
j. nevus
k. regeneration
l. sebum
m. suppuration

May be photocopied for student use.

Part II

_____ 1. Pertaining to the skin

_____ 2. Covered with or consisting of scales

_____ 3. The inner, sensitive, vascular layer of the skin

_____ 4. The ability to stretch and then return to the original shape

_____ 5. A fatty, oil secretion of the sebaceous glands

_____ 6. Repair, regrowth, or restoration of a part

_____ 7. Skin including sweat and oil glands

_____ 8. Circumscribed area of pathologically altered tissue

_____ 9. Forming or containing pus

a. cutaneous
b. dermatology
c. dermis
d. elasticity
e. exfoliation
f. horny tissue
g. integument
h. lesion
i. purulent
j. regeneration
k. sebum
l. squamous
m. suppuration

OBJECTIVE 2

Distinguish among characteristics of the layers of skin. Write an "E" in the blank before characteristics of the Epidermis and a "D" before characteristics of the Dermis.

_____ 1. Is made of the horny layer and growing layer

_____ 2. Produces ridges of the skin that form fingerprints

_____ 3. Lies directly beneath the epidermis and is composed of dense, fibrous connective tissue

_____ 4. Outer layer of the skin

_____ 5. Where dead cells are converted into keratin

_____ 6. Contains pigment or melanin

_____ 7. Made up of two layers: papillary and reticular

_____ 8. Contains no blood or lymph vessels or nerve endings

May be photocopied for student use.

OBJECTIVE 3

Choose the word or phrase that completes statements about skin appendages and their functions. Write the letter of the correct answer in the blanks provided.

_____ 1. Nails grow from

- a. epidermal cells that have been converted to keratin
- b. epithelial cells lying under the white crescent
- c. mitosis occurring in the dermis
- d. absorbing keratin from underlying skin

_____ 2. Attached to each hair bulb is a

- a. shaft
- b. sebaceous oil gland
- c. arrector pili muscle
- d. nevus

_____ 3. Hair on the arm

- a. has no apparent function
- b. keeps pores open
- c. assists nerves in the arms
- d. secretes oils to the skin

OBJECTIVE 4

State functions of the skin. In a short paragraph describe three specific functions of the skin.

May be photocopied for student use.

OBJECTIVE 5

Select from a list characteristics of healthy skin. Write an "X" in the blanks before characteristics of healthy skin.

_____ 1. Smooth texture

_____ 2. Ulcerations

_____ 3. Pale color

_____ 4. Good elasticity

_____ 5. Abnormal odor

_____ 6. Visible capillaries

_____ 7. Consistent color

OBJECTIVE 6

Choose the word or phrase that completes statements about skin changes during aging. Write the correct letter in the blank.

_____ 1. Skin wrinkles because

a. ultra-violet radiation dries it
b. it loses elasticity
c. sebaceous glands work less
d. fat deposits beneath the skin are lost

_____ 2. The skin change during aging is most closely related to changes in the underlying fibrous connective tissues and loss of fat tissues is

a. liver spots
b. decreased bruising
c. increased wrinkling
d. loss of elasticity

_____ 3. Exposure to ultra-violet radiation causes

a. liver spots
b. loss of elasticity
c. increased bruising
d. increased drying

_____ 4. One change in the skin as a consequence of aging is

a. the skin becomes drier
b. the skin assumes a characteristic odor
c. there is greater incidence of acne
d. skin demonstrates erythema

May be photocopied for student use.

_____ 5. One of the more obvious indicators of aging skin is

   a. liver spots
   b. paleness of the skin
   c. frequent boils
   d. frequent cyanosis

NOTE: Objective 7 is evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

THE INTEGUMENTARY SYSTEM

IV

OBJECTIVE 1

Part I		Part II	
1.	f	1.	a
2.	h	2.	l
3.	i	3.	c
4.	m	4.	d
5.	e	5.	k
6.	c	6.	j
7.	a	7.	g
8.	j	8.	h
9.	g	9.	i

OBJECTIVE 2

1. E
2. D
3. D
4. E
5. E
6. E
7. D
8. E

OBJECTIVE 3

1. b
2. c
3. a

OBJECTIVE 4

Answers should include any three of the following:

- Protects by acting as a mechanical barrier against microorganisms, sunlight, and chemicals
- Senses pain, heat, cold, touch, and pressure through nerve endings in the skin

- Regulates body temperature by varying the amount of blood flowing through the skin and sweat excretion
- Acts as an excretory organ through sweat glands
- Aids in maintaining fluid and electrolyte balances

OBJECTIVE 5 1, 4, 7

OBJECTIVE 6

1. d

2. d

3. a

4. a

5. a

OBJECTIVE SHEET

THE SKELETAL SYSTEM

V

INTRODUCTION

The 206 bones in the skeletal system make up the frame of the body. The skeleton gives us shape and form as well as motion and strength. It provides marrow, blood cells, and minerals for the body. Its proper operation is essential for good health.

UNIT OBJECTIVE

After completing this unit the student will be able to identify bone structures, types of bones, basic skeletal anatomy, and functions of the skeletal system. The student will demonstrate these competencies by completing an assignment sheet and a written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the skeletal system to their definitions.
2. List the five functions of the skeletal system.
3. List the elements found in bones.
4. Distinguish between the characteristics of compact and cancellous bone tissue.
5. Distinguish between functions of red and yellow bone marrow.
6. Select from a list true statements about bone growth.
7. Name the stage of the life cycle described by its bone development characteristics.
8. Label types of bones.
9. Match parts of long bones to their descriptions.
10. Label parts of long bones.
11. Match common bone markings to their descriptions.
12. Distinguish between bones from the two basic skeletal divisions.
13. Label bones of the skull and face.

14. Label sinuses found in the skull.

15. Label regions of the spinal column.

16. Label bones of the chest, upper back, and shoulder.

17. Define true ribs and false ribs.

18. Label bones of the arm and hand.

19. Label bones of the pelvis.

20. Label bone markings of the pelvis.

21. Compare male and female pelvises.

22. Label bones of the leg and foot and their markings.

23. Identify examples from the three classifications of joints.

24. Identify types of movable joints.

25. Communicate about how the skeletal system functions. (Assignment Sheet)

PREPARATION

- Review the unit and plan your presentation.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Review teaching suggestions and plan classroom activities.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Order materials to supplement the unit.

- Invite a guest speaker to discuss orthopedic or radiographic medicine.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. You may want to supply the Objective Sheet, Information Sheet and any other components you want covered. Confirm the scheduled appearance 2-3 days prior to the presentation.

- Obtain models and large pictures of the skeletal system, types of bones and joints, and bone structure. Models are available from Health Edco., P. O. Box 21207, Waco, TX 76702-1207, 800-299-3366 and Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

- Obtain a large bone from a butcher. Request that the bone be cut transversely.

- Make a poster of the major bones in the human skeleton.

- Make a bulletin board showing types of bones, bone systems, joints, or orthopedic or forensic medicine techniques.

- **HOSA** Integration

  - Assist students in conducting a chapter service project related to the unit information.

  - Develop objectives for the service project, identify a theme, and set a time line.

- Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
- Arrange for photographs of all public speaking, presentations, or other public contact.
- Host terminology and spelling contests.
- Assist students in scheduling and presenting prepared and extemporaneous speeches.
- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the skeletal system to their definitions.

- Discuss terms associated with the skeletal system.
- Have students play reinforcement games and work crossword puzzles using terms.
- Have a spelling bee using words in this unit.

Objective 2: List the five functions of the skeletal system.

- Have students list internal organs protected by the skeletal system.
- Have students inspect skeletal systems of other animals. Have students note the relationship between the skeletal systems and the shapes of the animals. Also have them note the internal organs protected by the animals' skeletal systems and compare them to internal organs protected by the human skeletal system.
- Have students brainstorm methods of movement in the animal kingdom that do not rely on a skeletal system, such as insects flying, jellyfish swimming, or snails secreting a fluid to slide on.
- Discuss the skeletal system and nutrition.

Objective 3: List the elements found in bones.

- Place one chicken leg in a plastic bag, a second in a beaker with 3% acetic acid for 24 hours, and a third in a 150° oven for three hours. Have students compare the three and determine which bone had minerals removed and which had collagen removed. Have students weigh the bones.

Objective 4: Distinguish between the characteristics of compact and cancellous bone tissue.

- Have students look at steak and chicken bones and classify the structures they find.
- Use Transparency Master 1 to illustrate functions of compact and cancellous bone.
- Have students look at bone cells through a microscope.
- If available, show students human skeletal models during discussion on structures of bones.

Objective 5: Distinguish between functions of red and yellow bone marrow.

- Tell students marrow can make up 5% of an adult's weight.
- Have students identify bones containing marrow.
- Discuss diagnostic uses of marrow.

Objective 6: Select from a list true statements about bone growth.

- Have students compare drawings, photographs, or radiographs of bones and skeletons at various ages and compare the bones.
- Have a forensic specialist or orthopedist discuss the changes in bone structure.

Objective 7: Name the stage of the life cycle described by its bone development characteristics.

- Have students discuss their own skeletal changes. Many will remember being long-legged at 14 or their children being flat-footed as toddlers.
- Have students list other physical changes taking place at the same time as the skeletal changes and note the connection all the changes.

- Have a forensic specialist discuss the use of growth patterns in identifying skeletal remains.

Objective 8: Label types of bones.

- Present pictures of various bones and have the students identify the type of bone shown.
- If available, show students models of various human bones.

Objective 9: Match parts of long bones to their descriptions.

Objective 10: Label parts of long bones.

- Have students brainstorm about the reason long bones are constructed the way they are. Tell them prehistoric man had heavier, less hollow bones. What can we do now as a result of this difference? One answer is float in water.
- Use Transparency Master 1 to illustrate parts of a long bone.
- If available, show students models of human long bones.
- Have students identify the areas of a chicken leg bone.

Objective 11: Match common bone markings to their descriptions.

- Show students radiographs of various bone markings and have them determine the type of marking being shown.
- If available, show students models of bones and point out markings.

Objective 12: Distinguish between bones from the two basic skeletal divisions.

- Have students suggest other ways the spine could be divided.
- Have students list ways bones in each division are the same.
- If available, show students a model of human skeleton.
- Use Transparency Master 2 and Student Supplement 1 to illustrate objective information.

Objective 13: Label bones of the skull and face.

- Have students identify the cranial and facial bones in a model skull.

- Have students identify joints in the skull. If available, use a model of human skull.
- Have students brainstorm why the skull is built as it is. Have them compare it to armor.

Objective 14: Label sinuses found in the skull.

- Review the functions of sinuses.
- If available, have students locate sinuses on a model of the human skull.

Objective 15: Label regions of the spinal column.

- Have students compare vertebrae from each spinal region.
- Use Transparency Master 3 to illustrate parts and regions of the spine.
- Have students compare vertebrae from other animals to human vertebrae. Use a model of the human skeleton, if available.
- Have students brainstorm why vertebrae vary in size as they do.
- Have students review proper lifting techniques.

Objective 16: Label bones of the chest, upper back, and shoulder.

- Have students identify the various bones on a model skeleton. Have them suggest possible uses and reasons for placement.
- Have students list internal organs protected by each axial bone.
- Use Transparency Master 4 to illustrate objective information.

Objective 17: Define true ribs and false ribs.

- Have students draw the rib cage before the unit is started. Have them compare their drawing to a correct drawing. Why are they relatively familiar with the shape of the rib cage?
- Discuss the sternum and its functions.
- If available, use a model of the human skeleton.
- Have students look at and draw a single rib.

Objective 18: Label bones of the arm and hand.

- Have students feel each bone discussed in their own hand.
- Have students compare foot and hand functions and bones.
- Have students compare radiographs of human hands and animal paws.
- Show models of human arm and hand bones, if available.
- Use Transparency Master 5 to illustrate objective information.

Objective 19: Label bones of the pelvis.

Objective 20: Label bone markings of the pelvis.

- Have students view sketches of individual and fused pelvic bones.
- Show models of human pelvis bones, if available.
- Discuss the hip joint.

Objective 21: Compare male and female pelvises.

- Show examples of pelvic shapes common to women.
- Show differences in markings and grooving between male and female pelvises.
- Use Transparency Master 6 to illustrate objective information.

Objective 22: Label bones of the leg and foot and their markings.

- Have students brainstorm why the leg bones are constructed as they are.
- Show students radiographs or drawings of hip replacements and injuries.
- Have students identify their own patella. Discuss how the knee joint works and why it is protected.
- Have a sports medicine specialist discuss legs and leg joints.
- Have students complete Activity Sheet 1.

Objective 23: Identify examples from the three classifications of joints.

Objective 24: Identify types of movable joints.

- Have students provide household objects such as cabinet door hinges that serve the same basic functions as various joints. Have them discuss similarities and differences.
- Have students discuss relationships between joint types and range of motion.
- Use Transparency Master 7 to illustrate joint classifications.
- Use Transparency Master 8 to illustrate types of movable joints.

APPLICATION

Objective 25: Communicate about how the skeletal system functions.

- Use the assignment sheet to encourage students to communicate their knowledge about the skeletal system and its importance.
- Set clear guidelines for students to complete the assignment.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete the appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *I Am Joe's Spine*. Pyramid Films, P.O. Box 1048, Santa Monica, California, 90406. (26 minutes, color)

- *Trainex Corporation*, P.O. Box 116, Garden Grove, California, 92642. Offers filmstrip series listed below.

  Transfer Activities and Ambulation

  Use of Patient Lifters

  Use of Protective Restraints

  Use of Stretchers

  Use of Wheelchairs

  Articular Anatomy and Physiology

  Lifting and Moving Patients

- *Opportunities for Learning, Inc.*, 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

  Anatomy and Physiology Filmstrips: The Skeletal System, Unit 3. (Filmstrip with cassette and instructor's guide)

  Human Systems Filmstrips Sets: The Skeletal System in the Human Body. Discusses bones and joints, relationship between skeletal system and nervous, muscular systems. (Filmstrip, cassette, student self-instruction booklet)

Print Media

- *Anatomical Charts from the Peter Bachin and Ernest Beck Series.* Available in framed, rod, and spiral form. Health Edco, P. O. Box 21207, Waco, TX 76702-1208, 800-299-3366.

- *Flash Cards on Bones and Muscles.* 102 two-color cards. Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

Software

- *Opportunities for Learning, Inc.*, 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

  Body in Focus. Software includes keyboard overlay, program guide, and resource material. Allows students to view torso, head, and arm layer-by-layer. For use on Apple or IBM computers, 48K.

The Body Transport. Software includes 29-page manual, three applications. "Body Assembly" allows students to learn about bone/organ placement, "Body Facts and Functions" reviews functions and identification, and "Make Your Own Anatomy Game" allows instructors to design games. For use on Apple or IBM computers, 48K.

The Human Body, An Overview. Software includes teachers's guide, 2 disks, and courseware kit. Uses multiple choice, true-false, and short answer questions. For use on Apple computers, 48K.

UNIT REFERENCES

- Duncan, Betty. *Allied Health Careers Instructional Workbook*. Oklahoma Department of Education: Stillwater, Oklahoma, 1987.
- Fong, Elizabeth, Elvira B. Ferris, and Esther G. Skelley. *Body Structures and Functions*. Delmar Publishers, Inc.: Albany, 1989.
- Hartman, Danene, and Dorothy Main. *Anatomy and Physiology*. Mid-America Vocational Curriculum Consortium, Inc.: Stillwater, Oklahoma, 1984.
- Kunz, Jeffrey. *The American Medical Association Family Medical Guide*. Random House, 1982.
- Rogers, Helen V. and Ann Benson. *Practical Nursing*. Oklahoma Department of Education, Curriculum and Instructional Material Center: Stillwater, Oklahoma, 1981.
- Sloan, Kathleen, Kathryn Persson, and S. Kathleen Moore. *Mosby's Anatomy and Physiology Laboratory Manual*. The C.V. Mosby Company: St. Louis, 1990.
- Shipman, Pat, Alan Walker, and David Bichell. *The Human Skeleton*. Harvard University Press: Cambridge, Massachusetts, 1985.

THE SKELETAL SYSTEM

OBJECTIVE 1

Match terms associated with the skeletal system to their definitions.

- **articular system** – the system of the body involving articulations (joints)
- **articulation** – a connection of bones; joint
- **bursa** – a pad-like sac or cavity located near a joint and filled with fluid
- **cartilage** – a type of dense, connective tissue consisting of cells embedded in a matrix which is firm, compact, and capable of withstanding pressure and tension
- **circumference** – the measurement around an article
- **collagen** – a fibrous protein found in connective tissue
- **diaphysis** – the shaft of a long bone

  NOTE: Plural is diaphyses
- **epiphysis** – the end of a long bone

  NOTE: Plural is epiphyses
- **ligament** – a band of fibrous connective tissue connecting bones, cartilages, and other structures and serving for support or for attachment of fascia or muscles
- **os** – bone
- **ossicle** – small bone
- **osteology** – the study of bones
- **periosteum** – the membrane that covers all long bones
- **process** – a prominence or projection of a bone
- **skeletal system** – the system of the body involving the bones, joints, and their attachments

OBJECTIVE 2

List the five functions of the skeletal system.

There are five functions of the human skeletal system:

- Support and shape for the body
- Protection for internal organs
- Movement and muscle anchorage
- Storage of mineral supply
- Formation of blood cells (hemopoiesis)

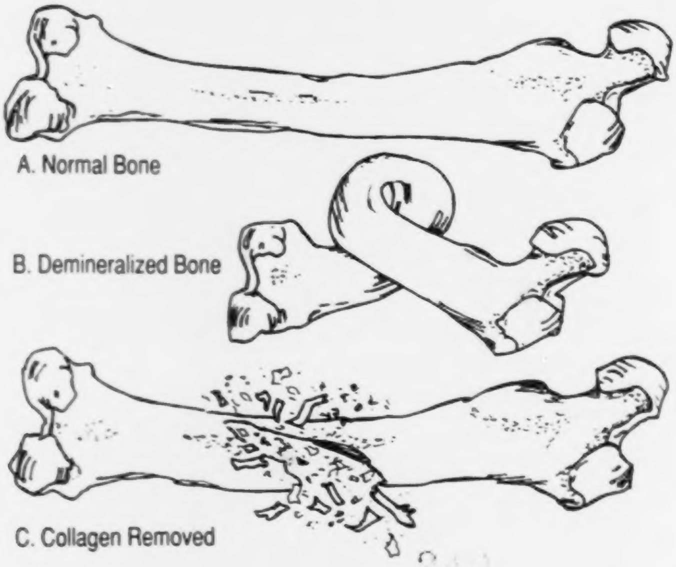
OBJECTIVE 3

List the elements found in bones.

Bone is made of two types of components:

- Minerals comprise 65% of the bone (by weight) and provide hardness. The primary minerals are:
  - Calcium
  - Phosphorous

  NOTE: Calcium phosphate and calcium carbonate together form hydroxyapatite crystals.
- Organic collagen comprises 35% of the bone (by weight) and provides bone tissue reinforcement.



A. Normal Bone

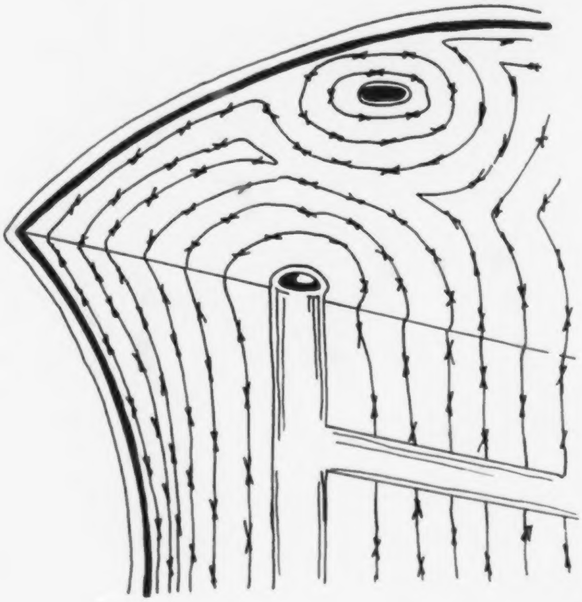
B. Demineralized Bone

C. Collagen Removed

OBJECTIVE 4 **Distinguish between characteristics of compact and cancellous bone tissue.**

There are two types of bone tissue:

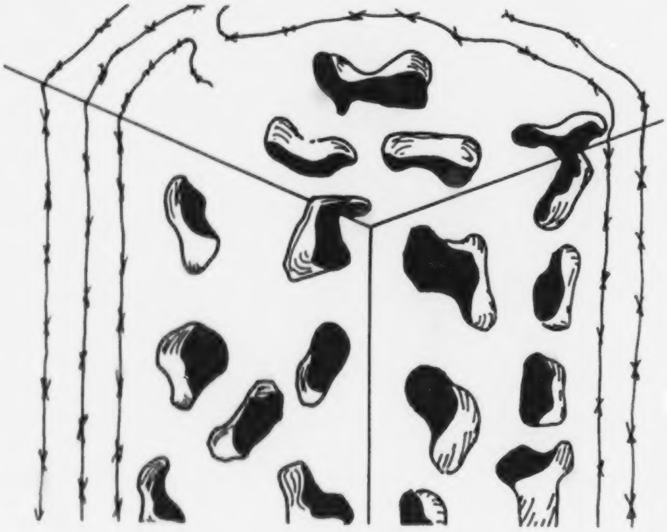
Compact bone tissue



- It is a solid, heavy bone; not very porous.
- Blood vessels and nerves pass through a series of canals.

  NOTE: Although bones seem to be hard and solid, they are made up of cells and contain nerves. The compact bone tissue has a series of canals, or pathways, for blood vessels and nerves to pass through the tissue.
- Bone cells grow in concentric circles around the canals

Cancellous bone tissue (sometimes called soft or spongy bone)



- It is more porous; large pores are called trabeculae.
- Marrow may be stored in cancellous bone.
- It is found inside compact bone.
- It is more lightweight.
- Blood vessels and nerves pass throughout the tissue.

OBJECTIVE 5

Distinguish between functions of red and yellow bone marrow.

Red bone marrow

- Found in cancellous tissue
- Produces blood cells and hemoglobin

Yellow bone marrow

- Found in the medullary canal
- Contains mostly fat cells; few or no blood cells
- Does not play a part in blood production

OBJECTIVE 6

Select from a list true statements about bone growth.

- Bones grow from the center of the diaphysis toward the epiphysis.
- The area of growth (called the growth zone) does not involve any joints.
- The thickness of the bone is correspondingly increased by cells called osteoblasts.
- The medullary cavities increase in diameter, increasing the circumference of the bone.

OBJECTIVE 7

Name the stage of the life cycle described by its bone development characteristics.

Embryo

- Bones begin as soft cartilage and later begin to ossify (harden).
- Some bones are still pliable at birth and will fuse and ossify with growth.

Childhood

- Bones grow in length and width.
- Joints may change the angles of some bones.

  EXAMPLE: At about age 1, most children are bow-legged; at age 4 they are knock-kneed; at maturity they are neither.

Adolescence

- Bones undergo periods of rapid growth.
- Growth may not be equal throughout the skeleton.

Maturity

- Skeletal adulthood is reached when growth is complete.
- Females reach skeletal adulthood about two years before males.
- Epiphyses of long bones begin to fuse and ossify.
- Joints of the skull and pubis fuse.

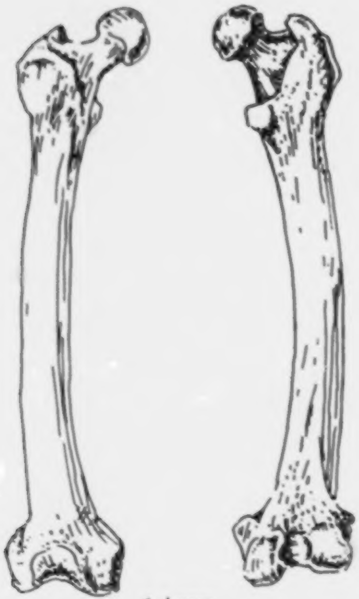
Old age

- Onset of osteoarthritis and osteoporosis (loss of bone mass)
- Onset of osteophytes (bone spurs)

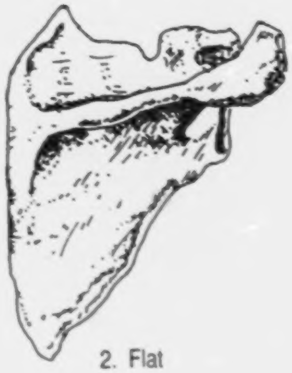
OBJECTIVE 8

Label types of bones.

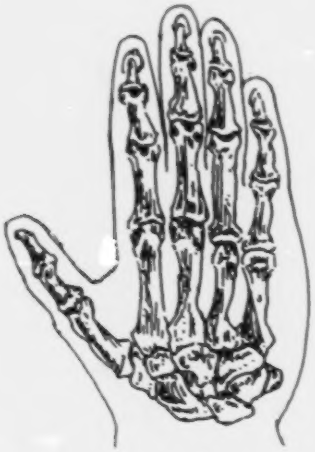
Bones are separated into four basic types according to their shape.



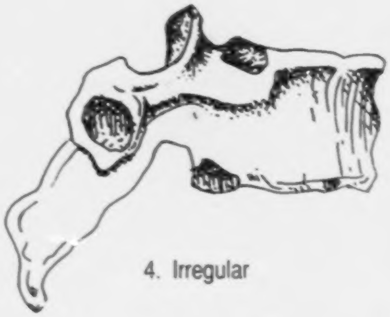
1. Long



2. Flat



3.Short



4. Irregular

OBJECTIVE 9 **Match parts of long bones to their descriptions.**

- **articular cartilage** — the bone tissue making up the outer layer of the epiphysis
- **cancellous bone** — lightweight, spongy bone
- **compact bone** — harder, less porous bone

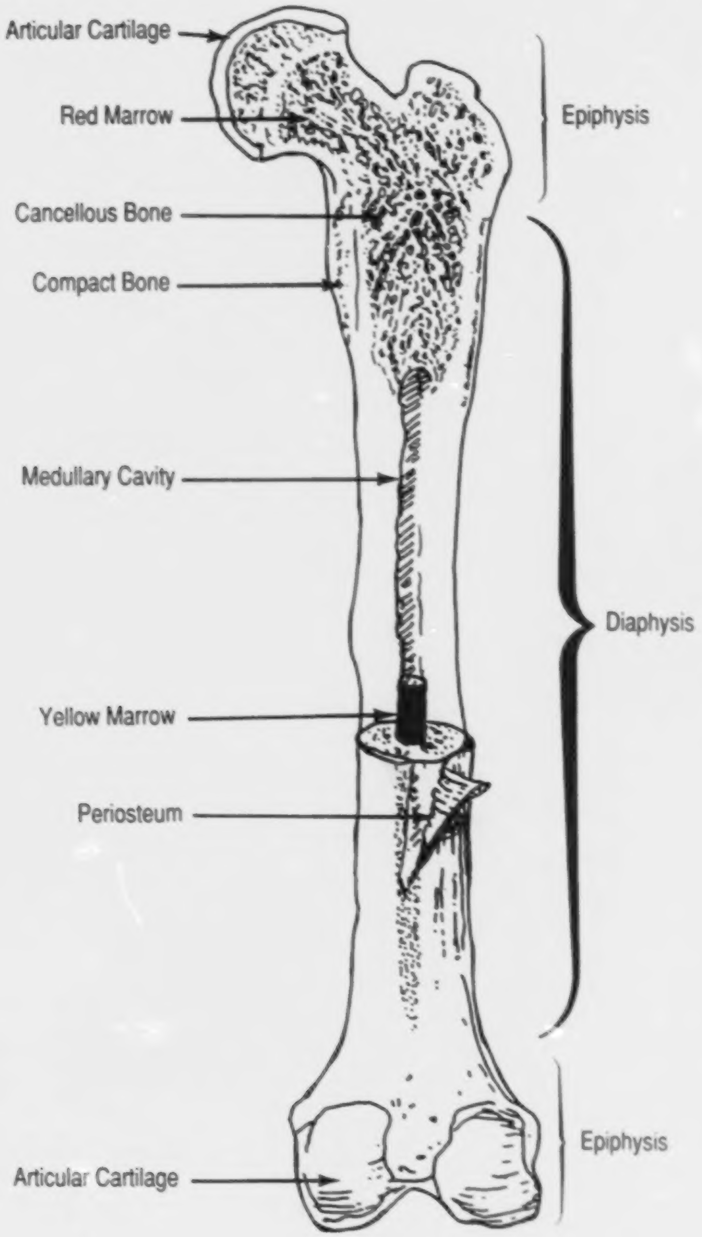
  NOTE: While long bones have both cancellous and compact bone tissue, many other bones are made of compact bone only.

- **diaphysis** — the long, hollow center portion of the bone made of hard and spongy bone and containing the medullary canal
- **epiphysis** — the knobby ends of the bone that are part of connecting joints and are made of hard and solid bone
- **medullary cavity** — the hollow core of long bones where marrow is stored
- **periosteum** — the fibrous tissue covering the outer layer of bones

  NOTE: The periosteum is found on all bones, not just long bones.

- **red marrow** — marrow used in the production of blood cells
- **yellow marrow** — fat-filled marrow

OBJECTIVE 10 | **Label parts of long bones.**


Articular Cartilage
Red Marrow
Cancellous Bone
Compact Bone
Medullary Cavity
Yellow Marrow
Periosteum
Articular Cartilage
Epiphysis
Diaphysis
Epiphysis

OBJECTIVE 11

Match common bone markings to their descriptions.

Bone markings have three primary functions:

Part of a joint

- **condyle** – a rounded projection that enters into formation of a joint
- **head** – a rounded projection beyond a narrow neckline portion

Areas of attachment for ligaments, tendons,or muscles

- **tubercle** – a small, rounded projection
- **tuberosity** – a large, rounded projection
- **trochanter** – a very large process
- **spinous process or spine** – a sharp projection
- **crest** – a ridge

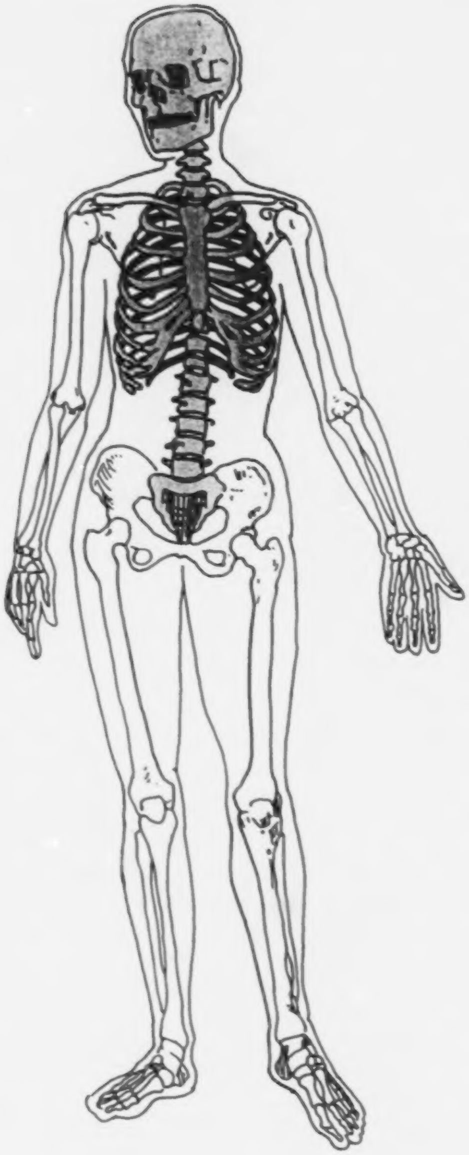
Channels for nerves or blood vessels

- **foramen** – a hole
- **meatus** – a tube-shaped opening
- **fossa** – a hollow or depression
- **sinus** – a cavity or spongelike space in a bone which is mucous-lined and filled with air spaces

OBJECTIVE 12

Distinguish between bones from the two basic skeletal divisions.

The two skeletal systems are the axial and appendicular skeletons.



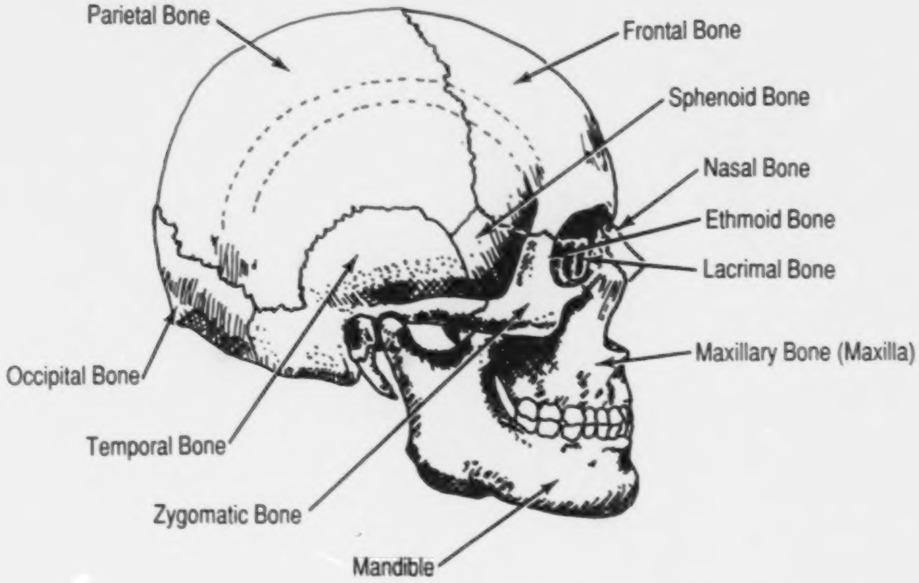
Axial skeleton

- Skull and facial bones
- Spine
- Ribs and sternum

Appendicular skeleton

- Shoulder girdle
- Arms
- Hands
- Pelvic girdle
- Upper and lower legs
- Feet and ankles

OBJECTIVE 13 | **Label bones of the skull and face.**


Parietal Bone
Frontal Bone
Sphenoid Bone
Nasal Bone
Ethmoid Bone
Lacrimal Bone
Maxillary Bone (Maxilla)
Occipital Bone
Temporal Bone
Zygomatic Bone
Mandible

Cranium

- Frontal bone
- Left and right parietal
- Occipital
- Left and right temporal
- Sphenoid
- Ethmoid

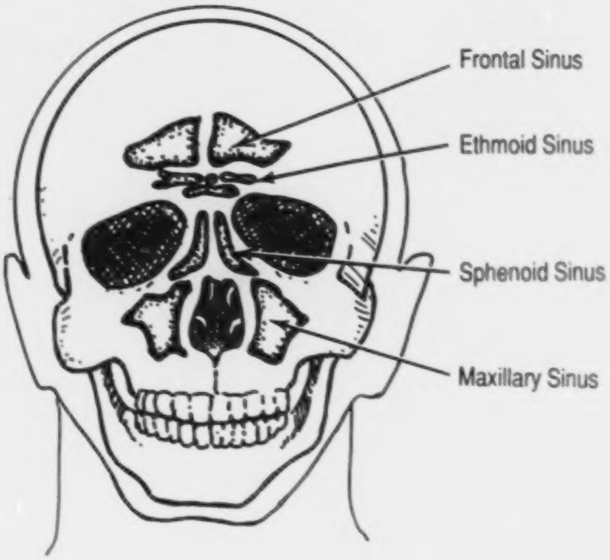
Facial bones

- Maxilla
- Mandible
- Ossicles in the ear (hammer, anvil, and stirrup)

  NOTE: These are not shown in the illustration.
- Nasal bone
- Lacrimal bone

- Zygomatic bone

OBJECTIVE 14 **Label sinuses found in the skull.**


Frontal Sinus
Ethmoid Sinus
Sphenoid Sinus
Maxillary Sinus

OBJECTIVE 15 **Label regions of the spinal column.**

Cervical (neck)

- Seven cervical vertebrae

NOTE: The first vertebrae is called the atlas, the second the axis. The atlas supports the skull and rotates upon the axis.

Thoracic (chest)

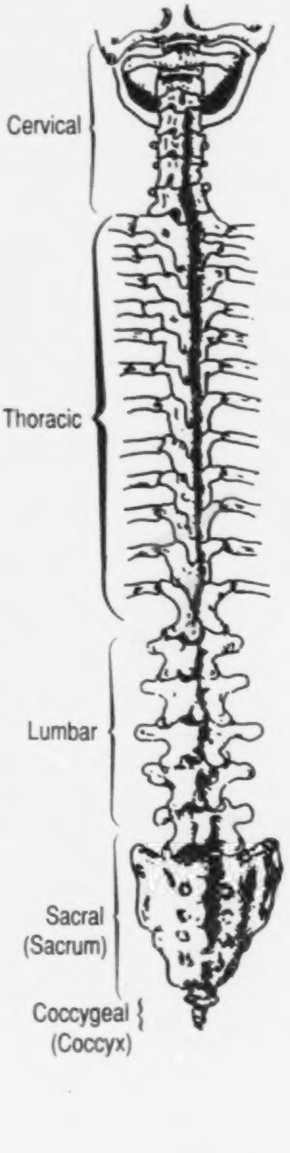
- Twelve thoracic vertebrae
- Lumbar (lower back)
- Five lumbar vertebrae

Sacral (hip)

- Five sacral vertebrae
- Sacral vertebrae are fused together

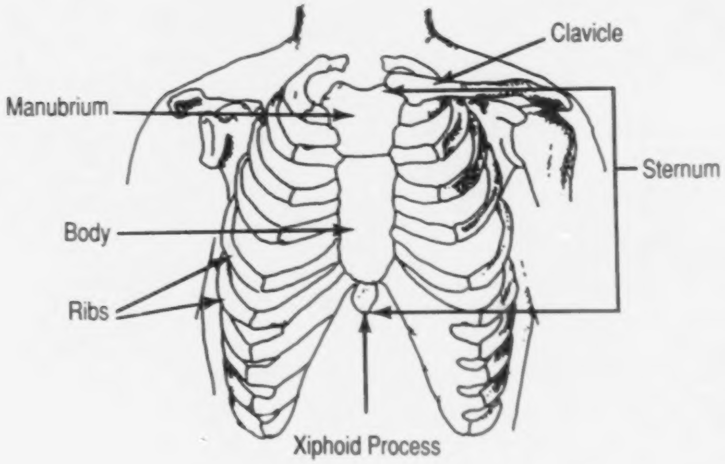
Coccyx (tail)

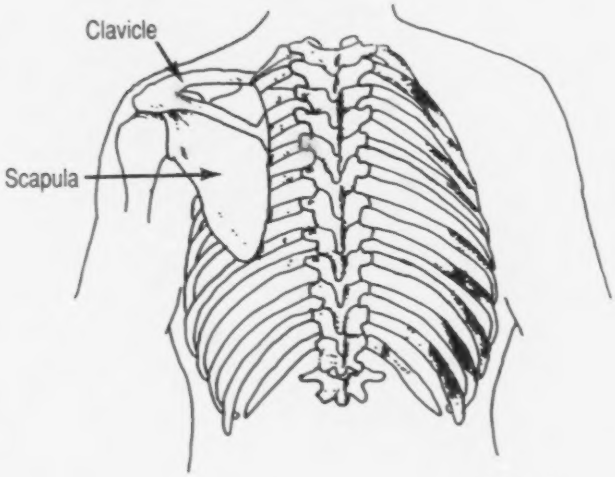
- Four coccygeal vertebrae
- Coccygeal vertebrae are fused together, forming the "tailbone"


Cervical
Thoracic
Lumbar
Sacral
(Sacrum)
Coccygeal
(Coccyx)

OBJECTIVE 16 **Label bones of the chest, upper back and shoulder.**

- Thoracic vertebrae
- Ribs
- Sternum
  - Manubrium (upper region)
  - Xiphoid process (lower area, made of cartilage)
  - Two clavicles (collar bones)
- Scapulae and clavicles (shoulder blades and bones)


Clavicle
Manubrium
Sternum
Body
Ribs
Xiphoid Process


Clavicle
Scapula

OBJECTIVE 17 **Define true ribs and false ribs.**

- **true ribs** – first seven pairs, connected to the sternum
- **false ribs** – next five pairs, attached to the seventh rib instead of the sternum. The last two pairs are floating ribs, connected to neither the sternum or seventh rib.

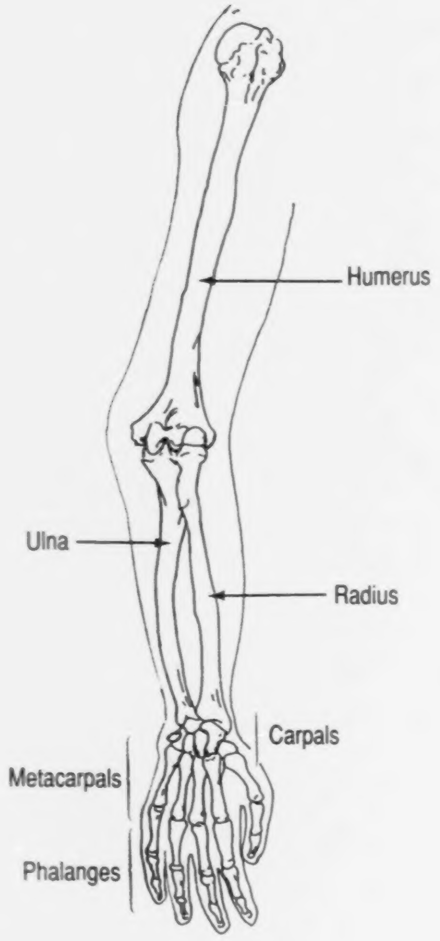
OBJECTIVE 18 **Label bones of the arm and hand.**

Arm

- Humerus
  - Upper arm
  - Second longest bone in the body
- Radius
  - Thumb side of the forearm
- Ulna
  - Forearm
  - The end of the ulna forms the elbow.

Hand

- Carpals
  - Makes the wrist
  - Eight bones in two rows
- Metacarpals
  - Make the palmar surface
  - Five bones
- Phalanges
  - Three in each finger
  - Two in the thumb


Humerus
Ulna
Radius
Carpals
Metacarpals
Phalanges

OBJECTIVE 19 **Label bones of the pelvis.**

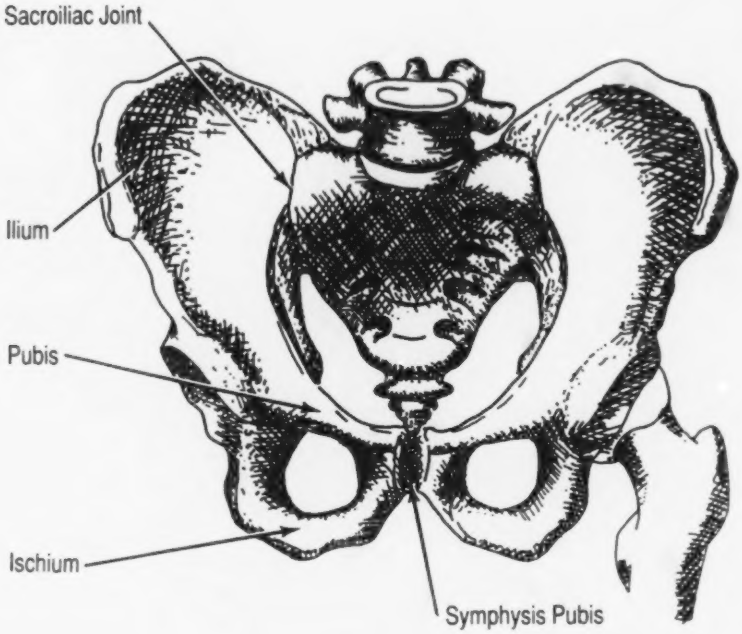
Innominate bones (pelvic girdle)

- Ilium
- Ischium
- Pubis

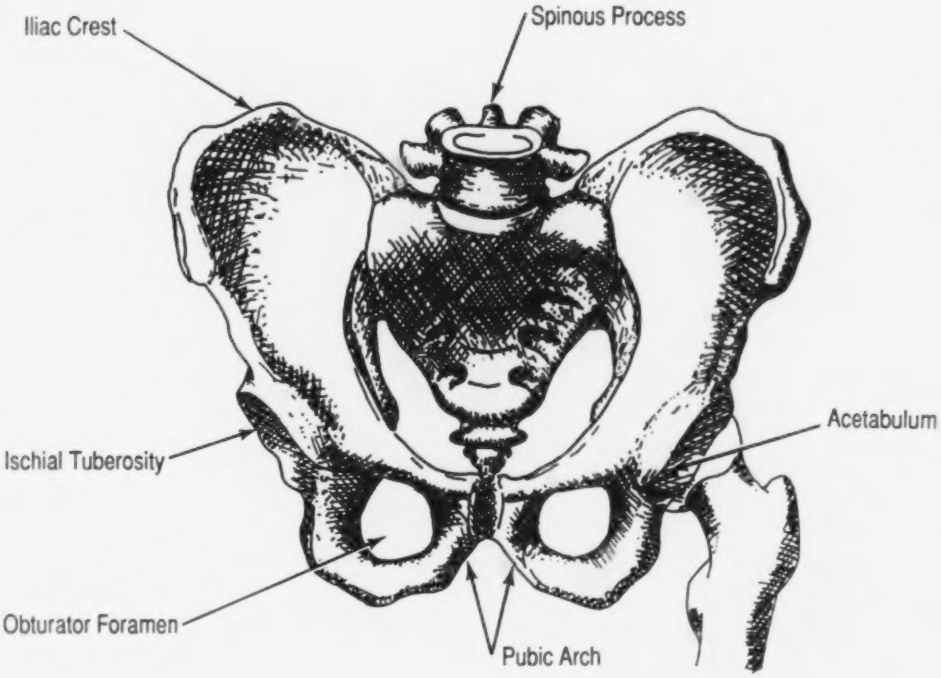
NOTE: The sacrum and the coccyx are connected to the pelvis and complete the posterior pelvic girdle but are considered part of the axial skeletal system.

Changes in the pelvic girdle

- Innominate bones fuse by adulthood into one series of bone (pelvic girdle)
- Joints remain in front (symphysis pubis) and back (sacroiliac joint)

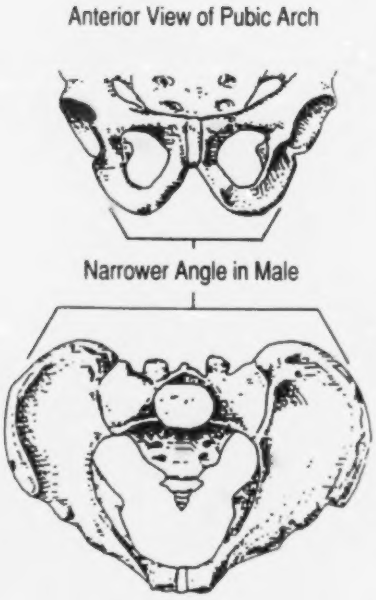

Sacroiliac Joint
Ilium
Pubis
Ischium
Symphysis Pubis

OBJECTIVE 20 | **Label bone markings of the pelvis.**

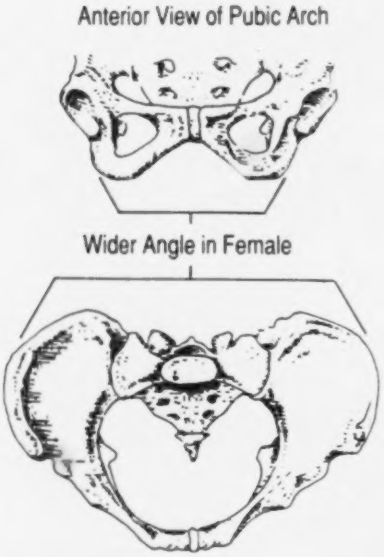

Iliac Crest
Spinous Process
Acetabulum
Ischial Tuberosity
Obturator Foramen
Pubic Arch

OBJECTIVE 21 **Compare male and female pelvises.**

- Female pelvis is wider.
- Female pelvic inlet is wider.
- Female pelvis is lighter and smoother.


Anterior View of Pubic Arch
Narrower Angle in Male

MALE


Anterior View of Pubic Arch
Wider Angle in Female

FEMALE

OBJECTIVE 22 **Label bones in the leg and foot and their markings.**

Femur

- Upper leg
- Largest and strongest bone in the body. To break a femur by applying pressure to the top of it, a force equal to 15,000-19,000 pounds per square inch is required. Most injuries are the result of impact to the side of the femur or a sudden twisting motion.

- The large, rounded head of the femur (the ball of the hip joint) fits into the acetabulum of the pelvis.
- Two primary processes, the greater and lesser trochanters

Tibia

- Larger of the two lower-leg bones

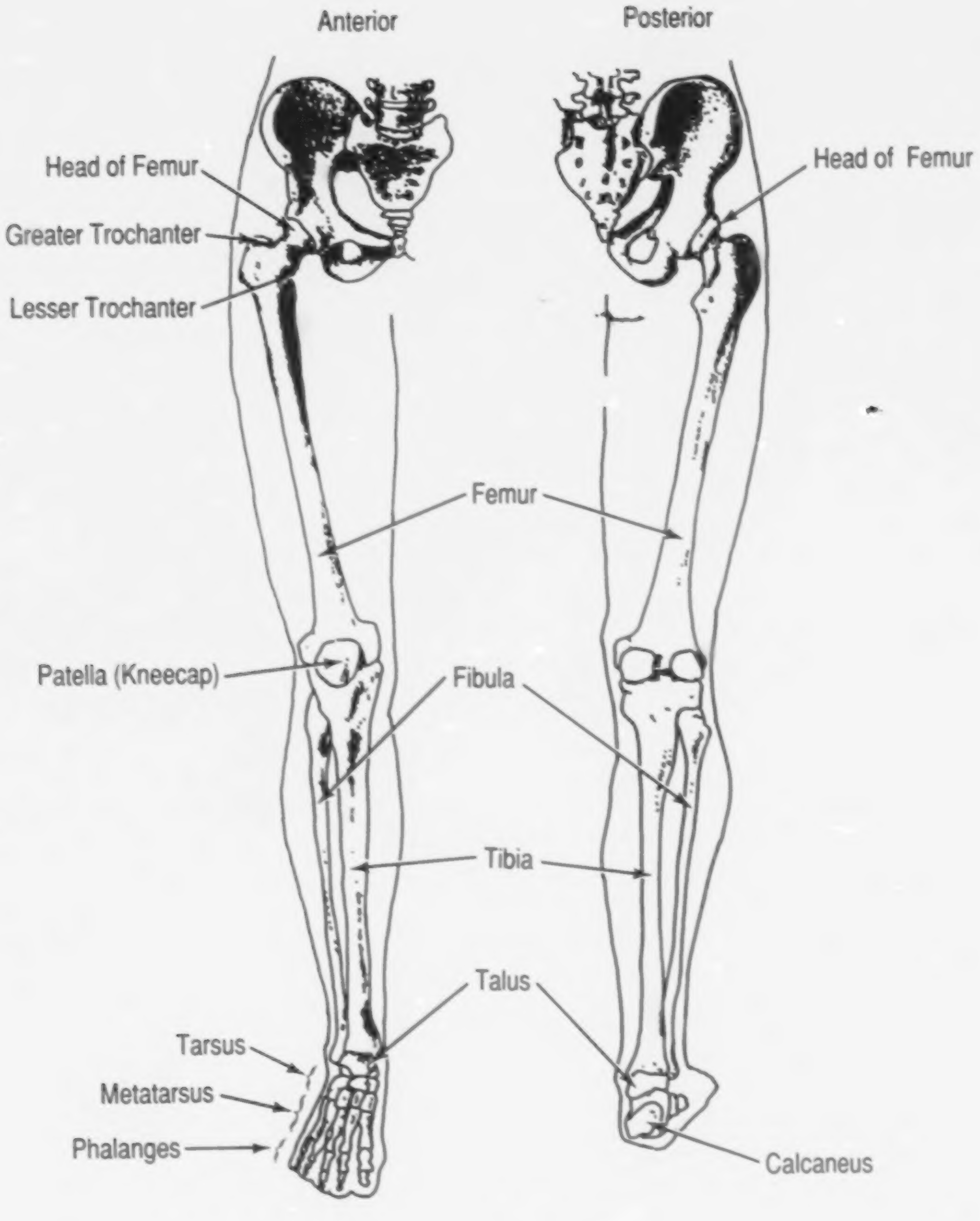
Fibula

- Lower leg

Patella (kneecap) and **sesamoid bone**

Foot and ankle bone

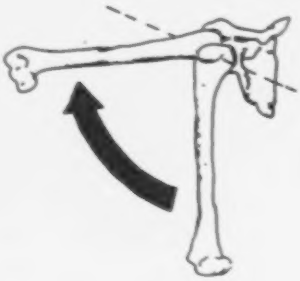
- Talus
- Tarsus (Tarsals)
- Metatarsus
- Phalanges
- Calcaneus


Anterior
Posterior
Head of Femur
Greater Trochanter
Lesser Trochanter
Head of Femur
Femur
Patella (Kneecap)
Fibula
Tibia
Talus
Tarsus
Metatarsus
Phalanges
Calcaneus

OBJECTIVE 23 **Identify examples from the three classifications of joints.**

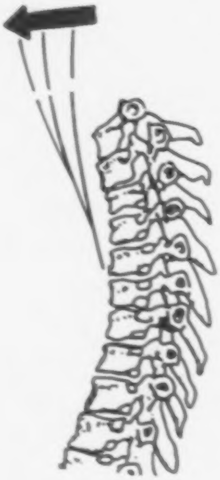
A joint occurs anytime two bones come into contact. There are three basic types of joints.

- **Diarthroses** (movable)

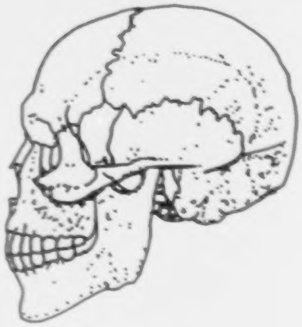


  - Are the most common type of joint
  - Contain an articular cartilage, a bursa, and a synovial cavity

- **Amphiarthroses** (partially movable)



- **Synarthroses** (immovable)



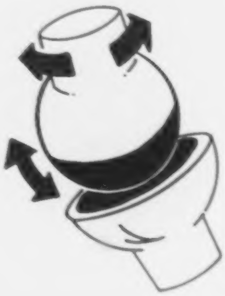
OBJECTIVE 24

Identify types of movable joints.

Ball and socket join

- Move most freely

EXAMPLES: hip and shoulder joints

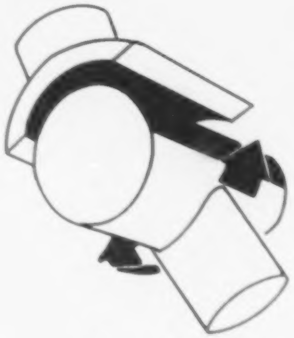


Ball and Socket Joint

Hinge joints

- Move in only one direction

  EXAMPLES: knee and elbow joints

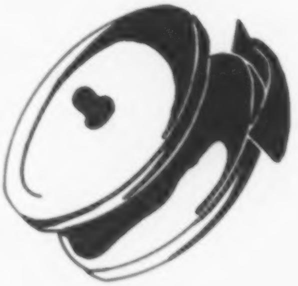


Hinge Joint

Pivot joints

- Allow for rotation

  EXAMPLES: joint between the radius and ulna at the elbow and the joint between the first two cervical vertebra

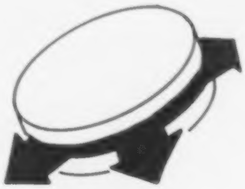


Pivot Joint

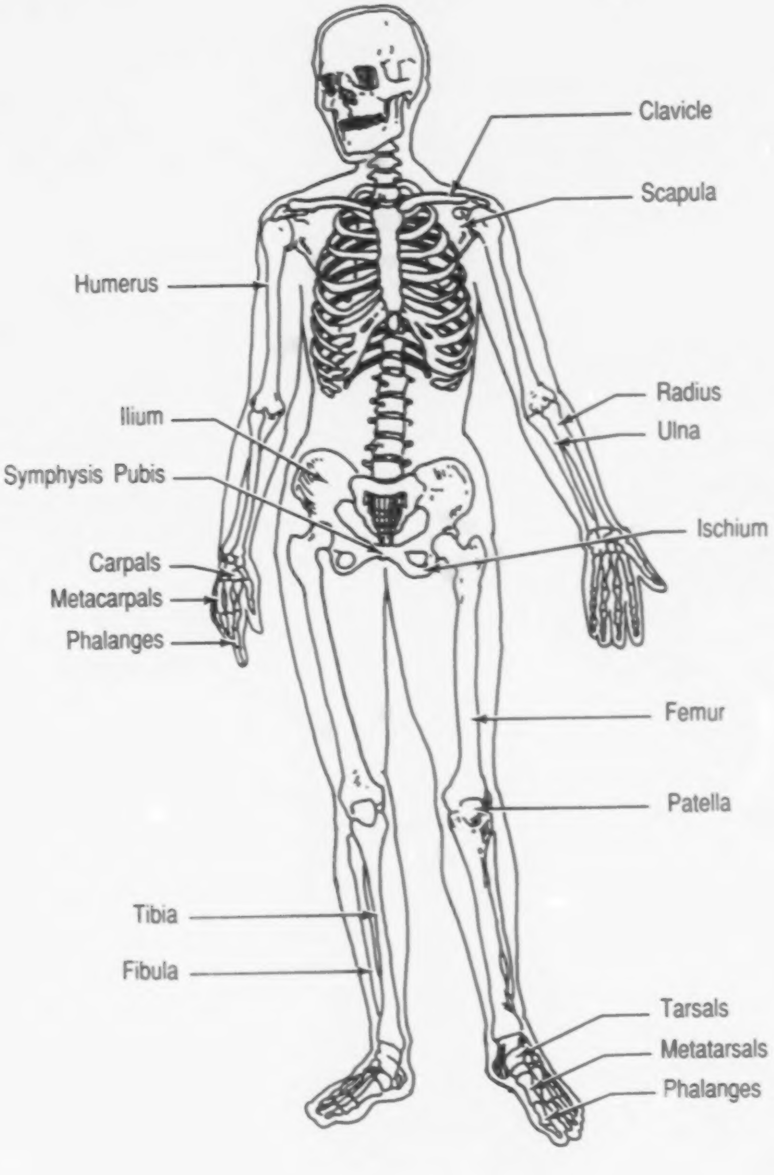
Gliding joints

- Two almost flat bones "glide" across each other

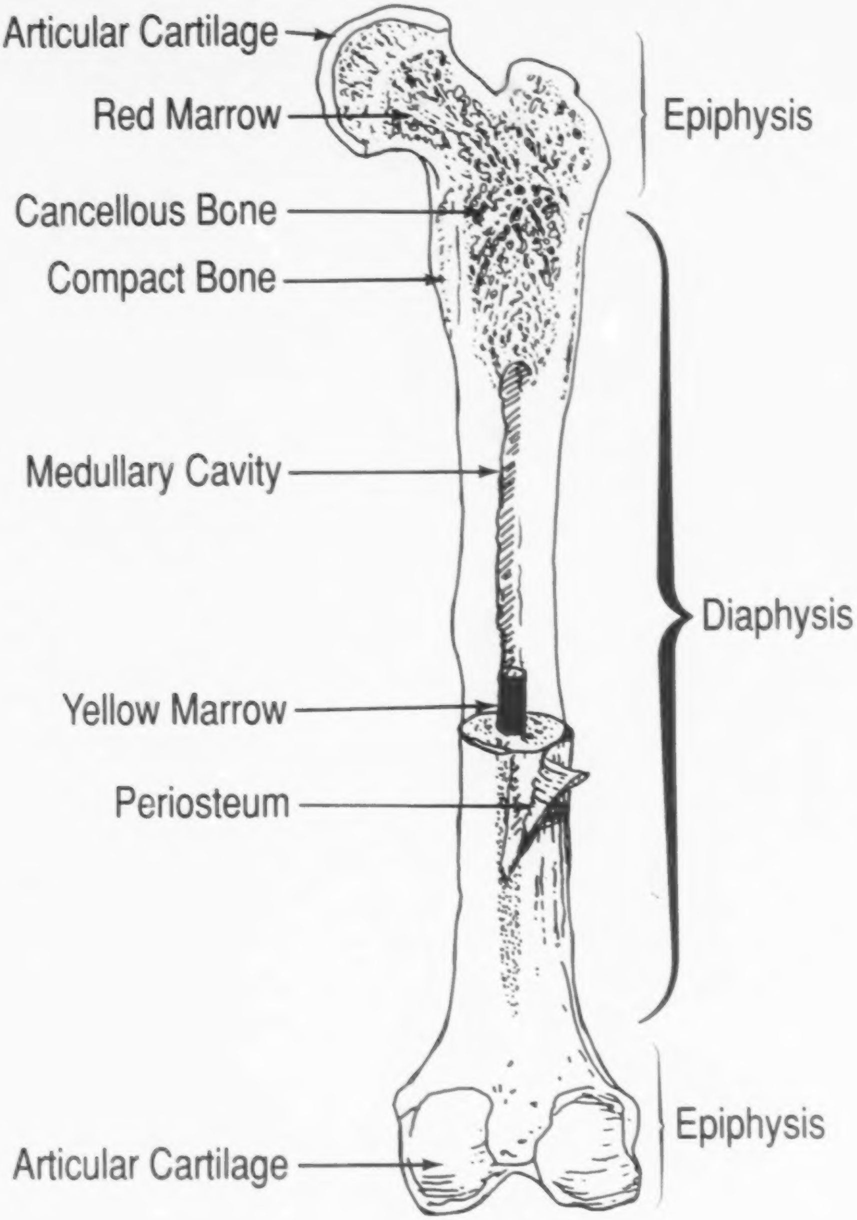
  EXAMPLES: intercarpal and intertarsel joints



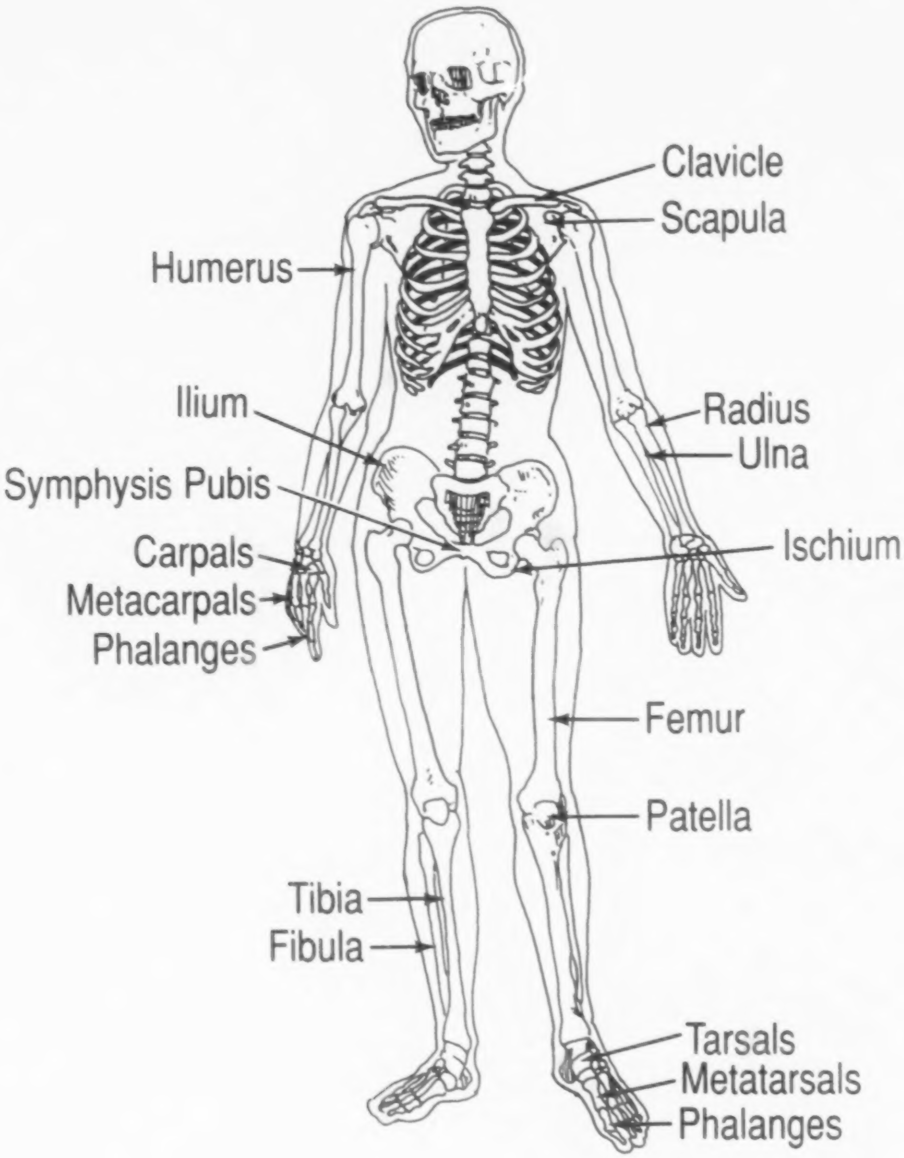
Gliding Joint


Clavicle
Scapula
Humerus
Radius
Ulna
Ilium
Symphysis Pubis
Ischium
Carpals
Metacarpals
Phalanges
Femur
Patella
Tibia
Fibula
Tarsals
Metatarsals
Phalanges

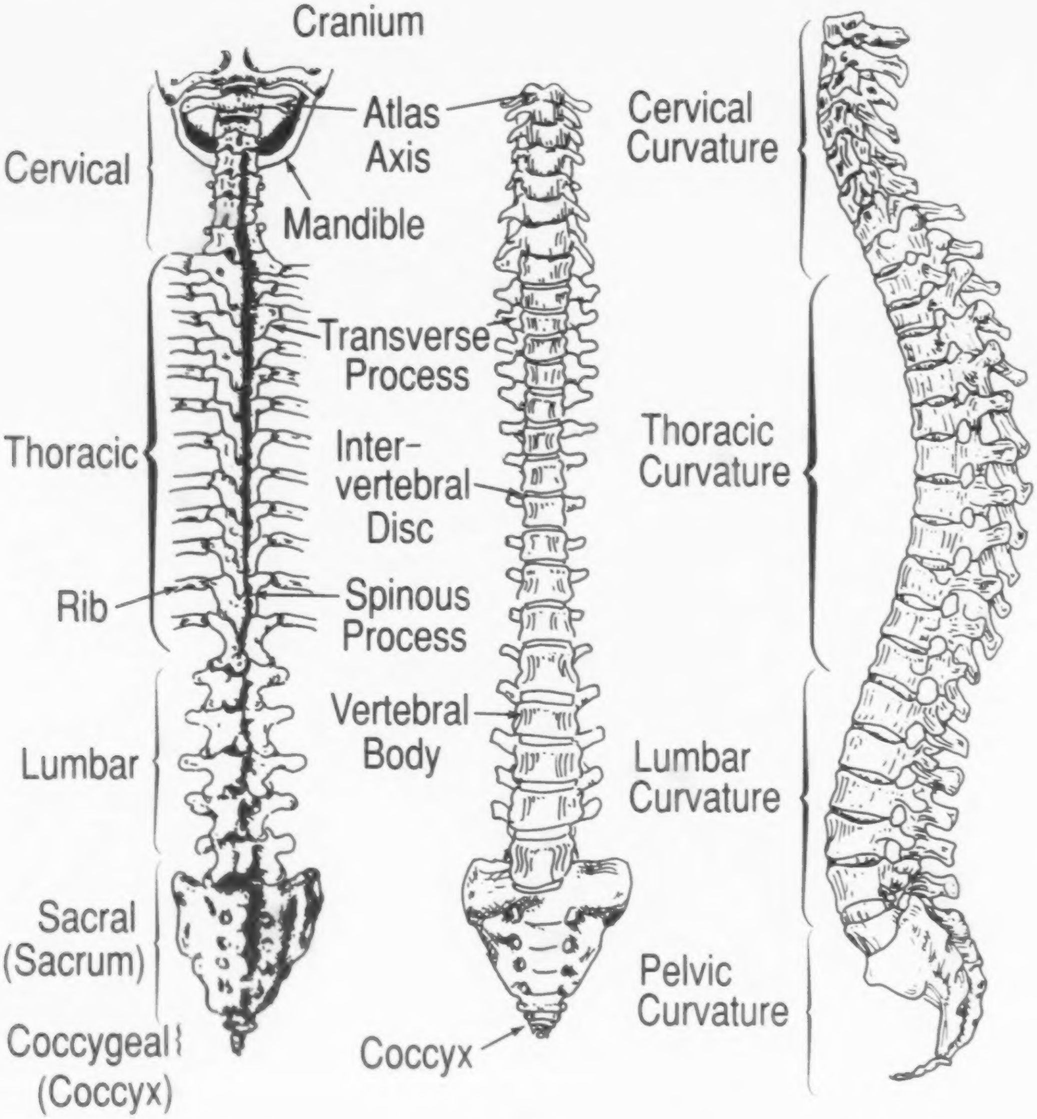
Structure of a Long Bone


Articular Cartilage
Red Marrow
Cancellous Bone
Compact Bone
Medullary Cavity
Yellow Marrow
Periosteum
Articular Cartilage
Epiphysis
Diaphysis
Epiphysis

Axial and Appendicular Skeleton

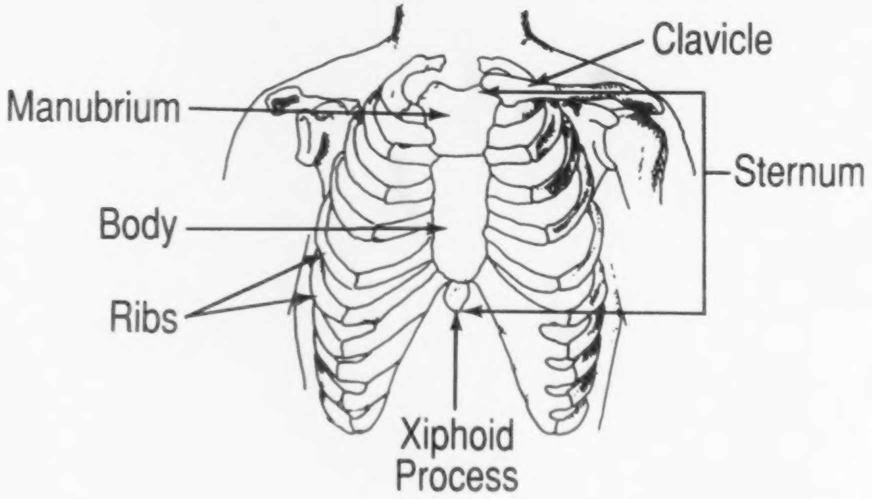

Clavicle
Scapula
Humerus
Radius
Ulna
Ilium
Symphysis Pubis
Ischium
Carpals
Metacarpals
Phalanges
Femur
Patella
Tibia
Fibula
Tarsals
Metatarsals
Phalanges

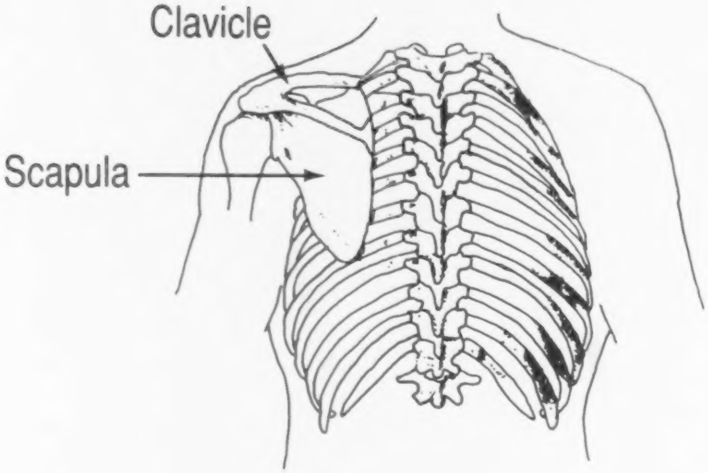
The Spinal Column


Cranium
Atlas
Axis
Cervical
Mandible
Transverse Process
Thoracic
Inter-vertebral Disc
Rib
Spinous Process
Lumbar
Vertebral Body
Sacral (Sacrum)
Coccygeal (Coccyx)
Coccyx
Cervical Curvature
Thoracic Curvature
Lumbar Curvature
Pelvic Curvature

Posterior **Anterior** **Side View**

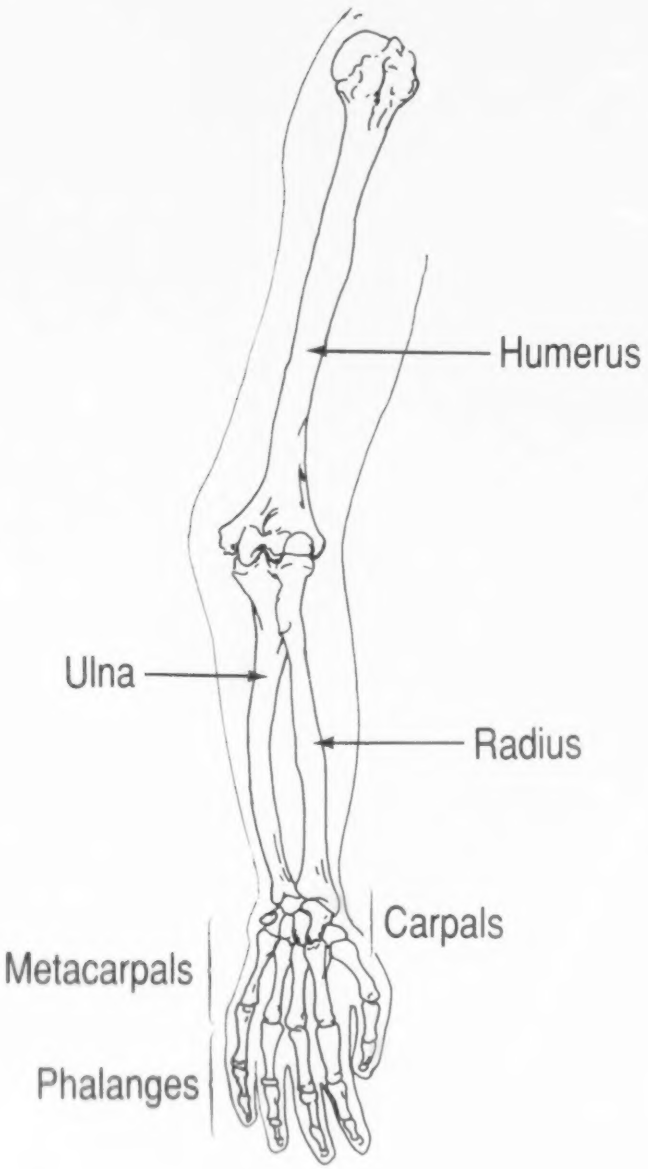
Bones of the Chest, Upper Back and Shoulder


Clavicle
Manubrium
Sternum
Body
Ribs
Xiphoid Process


Clavicle
Scapula

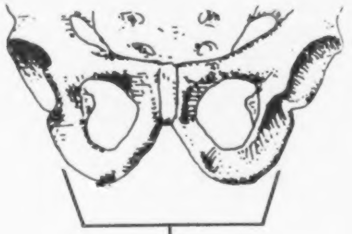
270

Bones of the Arms

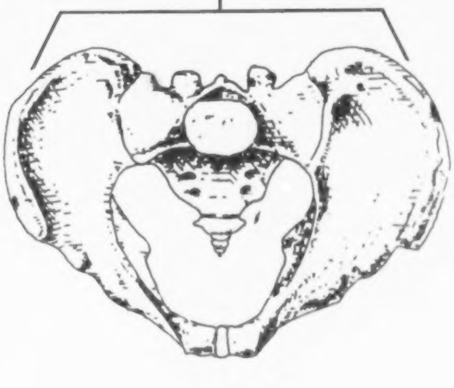

Humerus
Ulna
Radius
Carpals
Metacarpals
Phalanges

Male and Female Pelvis

Anterior View of Pubic Arch

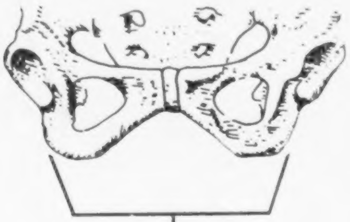


Narrower Angle in Male

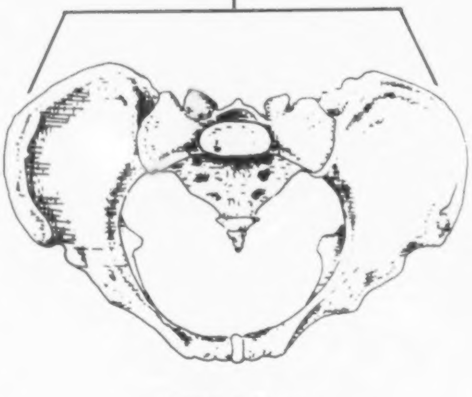


MALE

Anterior View of Pubic Arch

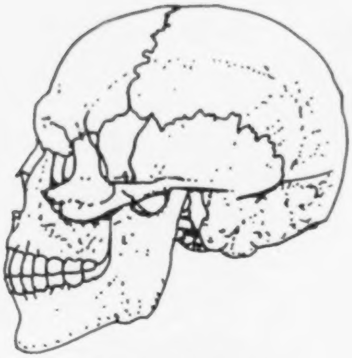


Wider Angle in Female

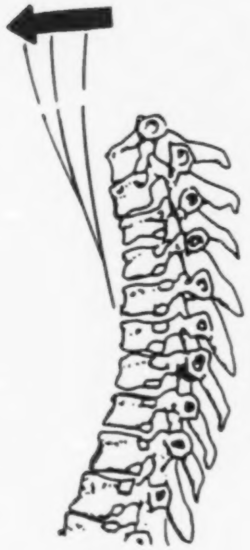


FEMALE

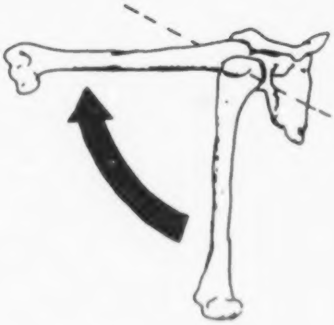
Different Types of Joints



Synarthroses
(Immovable)

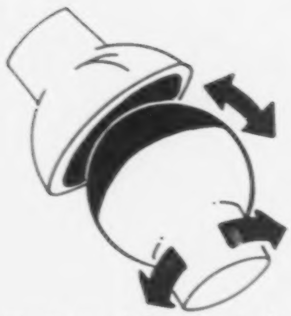


Amphiarthroses
(Partially Movable)

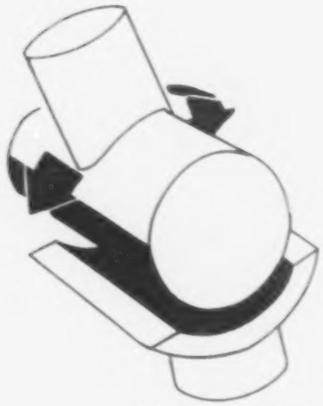


Diarthroses
(Movable)

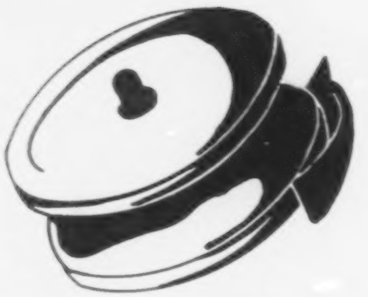
Types of Movable Joints



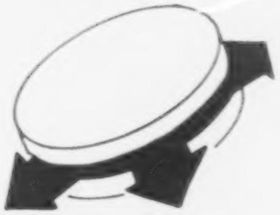
Ball and Socket Joint



Hinge Joint



Pivot Joint



Gliding Joint

ACTIVITY SHEET

Development of:
WRITING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, employability, and creative thinking skills are important.
- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Compose reports

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Analyze/synthesize information
  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing effective leadership

- If students have difficulty composing reports:
  - Discuss with the students the steps that they should follow when composing a report. The following steps should be included.
  - Identify the specific topic to be researched.
  - Decide what you want to know about the topic. Then write several questions that when answered will tell you what you want to know.
  - Identify sources of information that you can use to answer the questions you wrote.
  - Using the sources you identified, take notes that will help you answer your questions as you write the report.

  - Use your notes to write your report. Write a first draft and then revise and edit it by asking if it contains all the information needed to answer the questions you wanted to answer.
  - Proofread your report for correct grammar, mechanics, and spelling before writing a final copy.

- If students have difficulty analyzing/synthesizing information:
  - Explain that it is usually necessary to learn about complex items or things by examining their make-up or parts, such as studying body structure by examining each individual system or studying auto mechanics by examining the different automobile systems.
  - Also explain that it is sometimes necessary to then study the whole item or thing by studying how the parts work together to make the whole item work. This examination helps us identify and compare the relationships the parts have with each other.
  - Help the students understand the concepts by asking what they would do if they turned on a light and nothing happened. Lead them to discuss that they would probably first check to see if the light was plugged in or if the bulb was burned out. Plugging it in or replacing the light bulb might make the light come back on.
  - Then ask the students what they would do if the light still didn't work. Lead them to the conclusion that they should check to see if all the electricity was off. If it is, they will have to think about what they know about the whole electrical system–what are its parts. Identifying the parts of the whole will help them recognize the problem.

- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

- If students have difficulty developing effective leadership:
  - Have the class discuss traits that make a person an effective leader.
  - Remind the students that an effective leader does not boss people needlessly or order other people to do his or her work–an effective leader is a person who can get a task finished by combining his or her talents with the talents of the other people to best complete a project. It is a person who can both suggest ideas and listen openly to the ideas of others. It is a person who can make an educated decision when necessary to the success of the project.
  - Provide students with opportunities to develop leadership skills by dividing the class into groups to plan and complete the assignment sheet activity or any other appropriate activity.
  - Work with the groups to ensure that each student has the opportunity and the information needed to lead one phase of the assignment.

Composition Skills
- Compose reports

Cognitive Activities Skills
- Analyze/synthesize information
- Create a finished product (written)

COMPARE ARMS AND HANDS TO LEGS AND FEET

Prepare a poster or model of arms with hands and legs with feet. Label similarities and differences.

or

Prepare a poster or model of a skeleton, switching arms/hands and legs/feet.

or

Compare motions and movements of arms/hands and legs/feet. Compare thumbs and fingers to toes, elbows to knees, and shoulders to hips.

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization

  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language

  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:

  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.

  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."

  - Discuss how body language is used in skits and mime to convey the appropriate meaning.

- If students have difficulty adapting their presentation to a specific audience:

  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.

  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.

- If students have difficulty creating a finished product:

  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.

  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

ASSIGNMENT SHEET

THE SKELETAL SYSTEM

V

Name ______________________________ Score ____________

OBJECTIVE 25

Communicate about how the skeletal system functions.

INTRODUCTION

Promoting an understanding of the skeletal system is an important part of health care. Understanding how the systems of the body work is the first step in understanding how to care for them. Sharing this information with others is another step. There are many ways to share information including making a speech to a group of orthopedic patients (children, teens, or adults), writing a brochure, teaching an actual lesson in posture, or in correct use of the body. On the lighter side, you might present a skit about the skeleton and its functions, write a television commercial, or draw a cartoon.

DIRECTIONS

- Prepare a poster or brochure illustrating functions of the skeletal systems.
- Create a poster, pamphlet, brochure, oral report, commercial cartoon, or skit on the skeletal system. Present the project to the class.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (oral and written)

Job Acquisition/ Development Skills

- Develop effective leadership

ASSIGNMENT SHEET

Set clear guidelines for the completion of the project and evaluate work on the basis of those guidelines.

Sample Guidelines

- The brochure should be between 350-700 words (1 to 2 typewritten pages, double spaced).
- Grammar and spelling should be correct.
- Ideas should flow in a meaningful order.

WRITTEN TEST

THE SKELETAL SYSTEM

V

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with the skeletal system to their definitions. Write the correct letter in the blanks.

Part I

_____ 1. A connection of bones; joint

_____ 2. A type of dense, connective tissue consisting of cells embedded in a matrix which is firm, compact, and capable of withstanding pressure and tension

_____ 3. Small bone

_____ 4. A pad-like sac or cavity located near a joint and filled with fluid

_____ 5. The system of the body involving articulations (joints)

_____ 6. Bone

_____ 7. The study of bones

_____ 8. The system of the body involving the bones, joints, and their attachments

a. articular system

b. articulation

c. bursa

d. cartilage

e. circumference

f. ligament

g. os

h. ossicle

i. osteology

j. periosteum

k. process

l. skeletal system

May be photocopied for student use.

Part II

_____ 1. The membrane that covers all long bones

_____ 2. The measurement around an article

_____ 3. A fibrous protein found in connective tissue

_____ 4. A prominence or projection of a bone

_____ 5. A band of fibrous connective tissue connecting bones, cartilages, and other structures and serving for support or for attachment of fascia or muscles

_____ 6. The end of a long bone

_____ 7. The shaft of a long bone

a. bursa
b. cartilage
c. circumference
d. collagen
e. diaphysis
f. epiphysis
g. ligament
h. os
i. osteology
j. periosteum
k. process

OBJECTIVE 2 **List the five functions of the skeletal system.**

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________
5. ______________________________

OBJECTIVE 3 **List the elements found in bones.**

Minerals:

1. ______________________________
2. ______________________________

Other compound

1. ______________________________

May be photocopied for student use.

OBJECTIVE 4

Distinguish between the characteristics of compact and cancellous bone tissue. Write an "A" in the blanks before characteristics of compact bone and a "B" in the blanks before characteristics of cancellous bone tissue.

_____ 1. Blood vessel and nerves pass throughout the tissue.

_____ 2. It is more porous; large pores are called trabeculas.

_____ 3. Bone cells grow in concentric circles around the canals.

_____ 4. It is more lightweight.

_____ 5. It is a solid, heavy bone; not very porous.

_____ 6. Marrow may be stored in them.

_____ 7. Blood vessels pass through a series of canals.

OBJECTIVE 5

Distinguish between functions of red and yellow bone marrow. Write an "R" in the blanks before functions of red bone marrow and a "Y" in the blanks before functions of yellow bone marrow.

_____ 1. Contains mostly fat cells; few or no blood cells

_____ 2. Does not play a part in blood production

_____ 3. Found in cancellous tissue

_____ 4. Found in the medullary canal

_____ 5. Produces blood cells and hemoglobin

OBJECTIVE 6

Select from a list true statements about bone growth. Write an "X" in the blank before each true statement.

______1. The area of growth (called the growth zone) does not involve any joints.

______2. The medullary cavities increase in diameter, increasing the circumference of the bone.

______3. Bones grow from the center of the epiphysis to the diaphysis.

______4. Joints are involved in all bone growth.

May be photocopied for student use.

______5. Growth takes place from the center of the diaphysis toward the epiphysis.

______6. The thickness of the bone is increased by cells called osteoblasts.

OBJECTIVE 7

Name the stage of the life cycle described by its bone development characteristics. Write the name of the stage described in the blank.

1. Skeletal adulthood is reached when growth is complete; females reach skeletal adulthood about two years before males; epiphyses of long bones begin to fuse; joints of the skull and pubis fuse and ossify

____

2. Bones begin as soft cartilage and later begin to ossify; some bones are still pliable at birth and will fuse and ossify with growth

____

3. Periods of rapid growth; growth may not be equal throughout the skeleton

____

4. Onset of osteoarthritis and osteoporosis (loss of bone mass); onset of osteophytes (bone spurs)

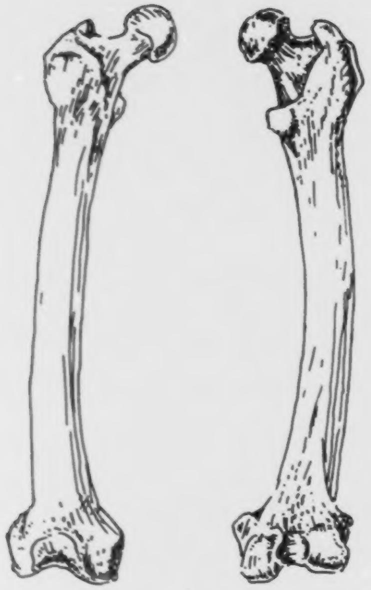
____

5. Bones grow in length and width; joints may change the angles of some bones

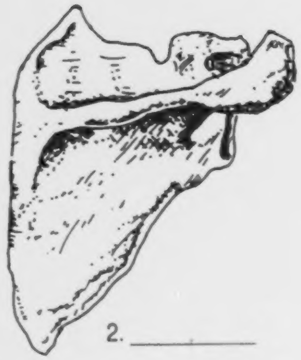
____

May be photocopied for student use.

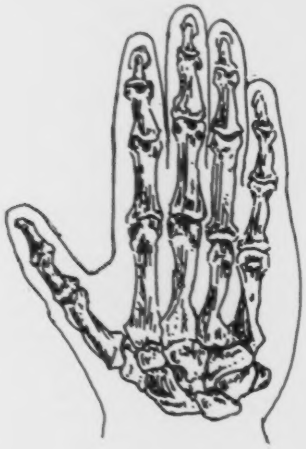
OBJECTIVE 8 | **Label types of bones.** Write the type of bone in the blank.



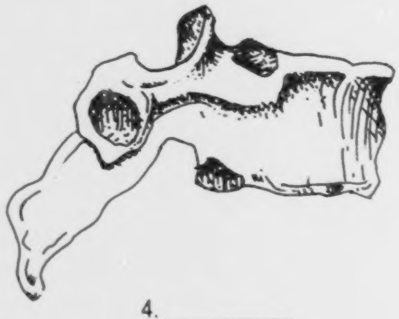
1. __________



2. __________



3. __________



4. __________

OBJECTIVE 9

Match parts of long bones to their description. Write the correct letters in the blanks.

_____ 1. The knobby ends of the bone that are part of connecting joints and are made of hard and solid bone

_____ 2. Marrow used in the production of blood cells

_____ 3. The long, hollow center portion of the bone made of hard and spongy bone and containing the medullary canal

_____ 4. Fat-filled marrow

_____ 5. The bone tissue making up the outer layer of the epiphysis

_____ 6. The fibrous tissue covering the outer layer of bones

_____ 7. The hollow core of long bones where marrow is stored

_____ 8. Harder, less porous bone

_____ 9. Lightweight, spongy bone

a. articular cartilage

b. articular cavity

c. cancellous bone

d. compact bone

e. diaphyseal cartilage

f. diaphysis

g. epiphysis

h. medullary cartilage

i. medullary cavity

j. periosteum

k. process

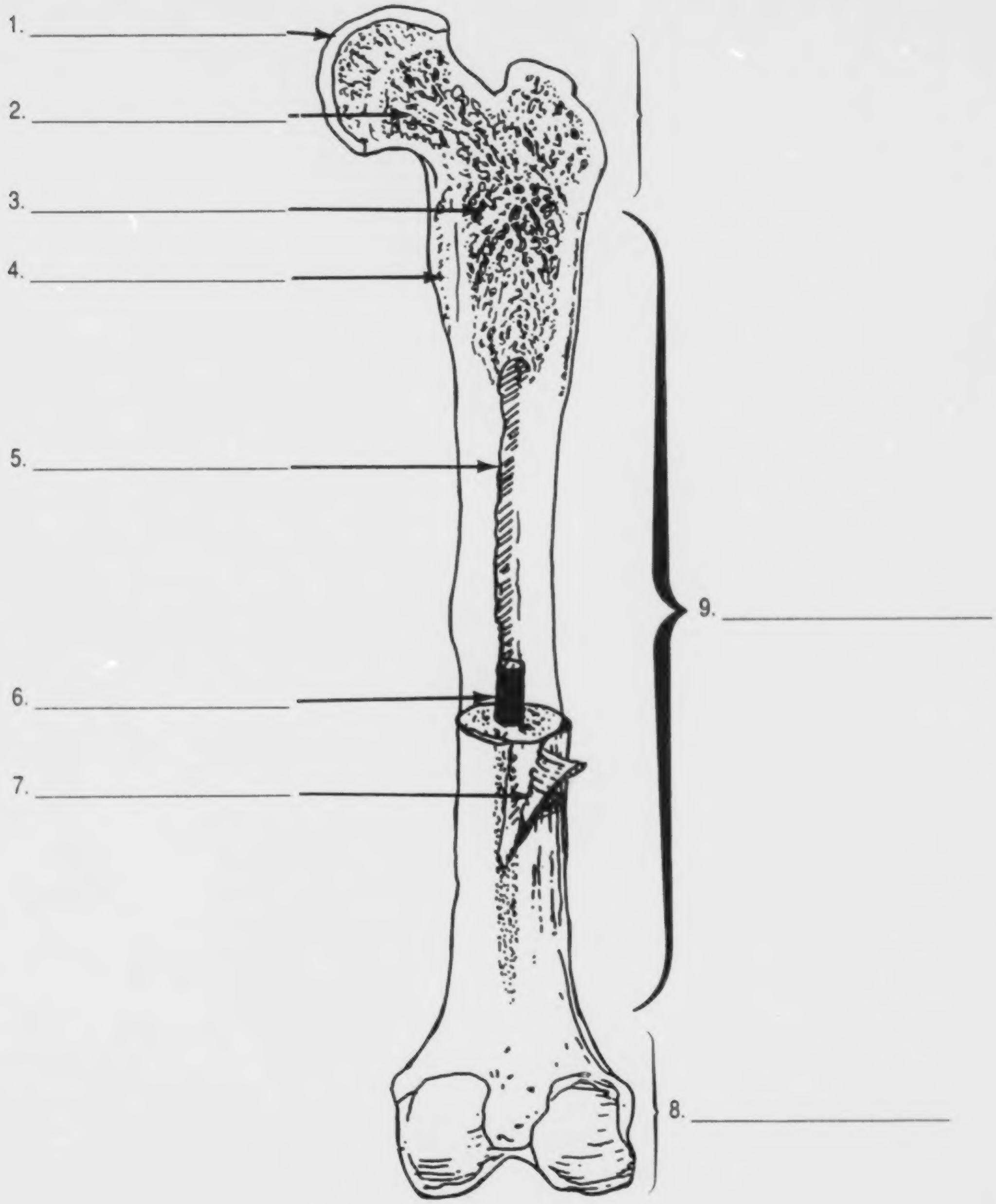
l. red marrow

m. yellow marrow

290

May be photocopied for student use.

OBJECTIVE 10 | **Label parts of long bones.** Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 11 **Match common bone markings to their descriptions.** Write the letters in the blanks.

Part I

_____ 1. A large, rounded projection

_____ 2. A sharp projection

_____ 3. A very large process

_____ 4. A small, rounded projection

_____ 5. A ridge

a. condyle

b. crest

c. foramen

d. head

e. spinous process or spine

f. trochanter

g. tubercle

h. tuberosity

Part II

_____ 1. A hollow or depression

_____ 2. A hole

_____ 3. A rounded projection beyond a narrow neckline portion

_____ 4. A tube-shaped opening

_____ 5. A cavity or sponge like space in a bone which is mucous lined and filled with air spaces

_____ 6. A rounded projection that enters into formation of a joint

a. condyle

b. crest

c. foramen

d. fossa

e. head

f. meatus

g. sinus

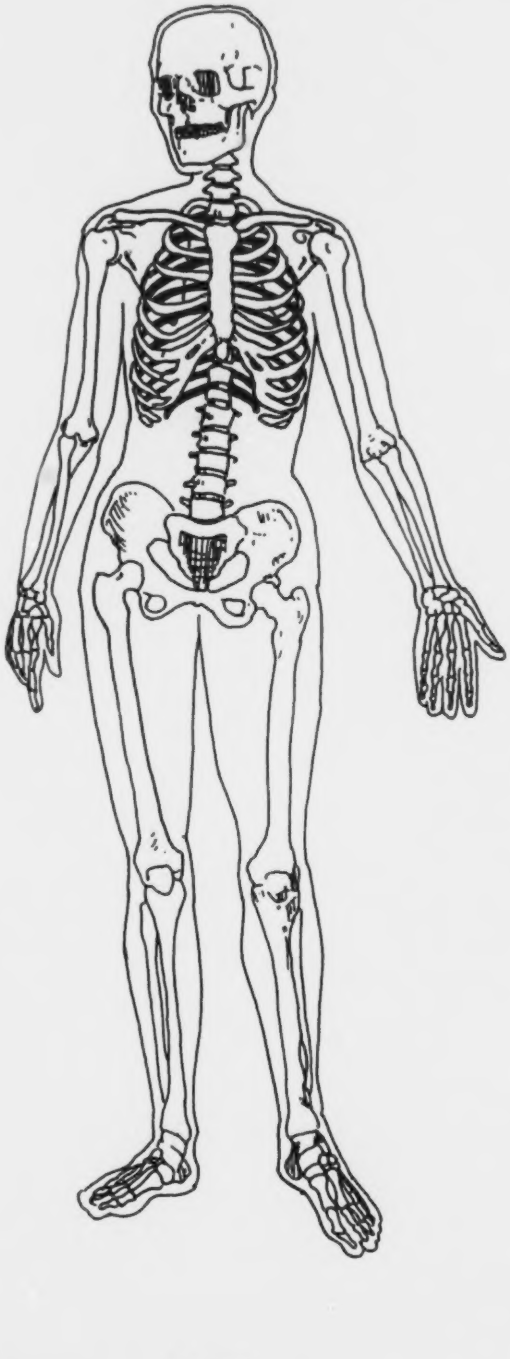
h. trochanter

i. tubercle

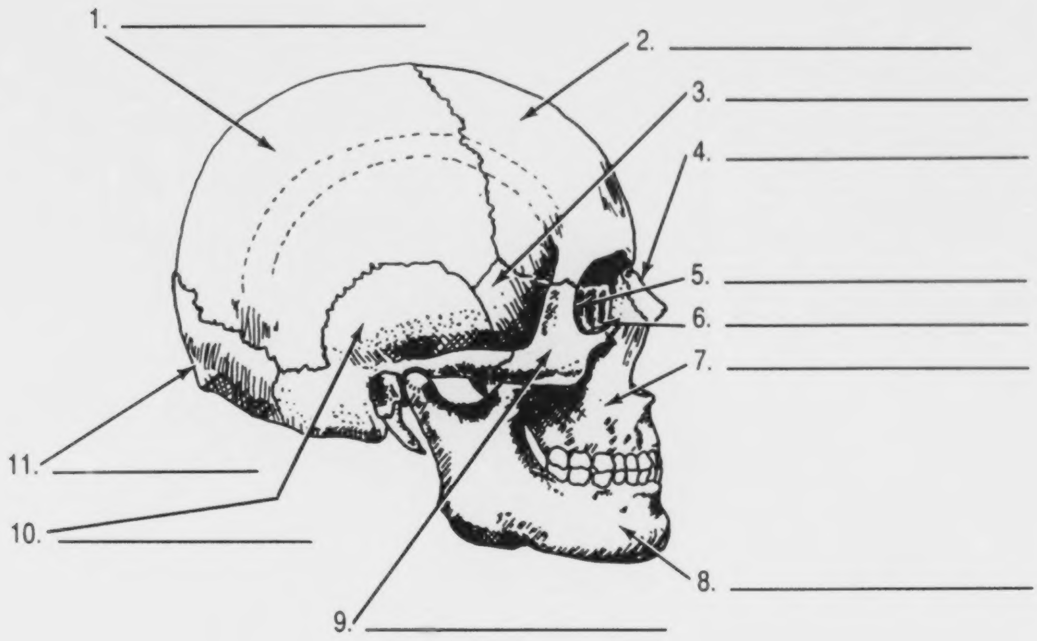
May be photocopied for student use.

OBJECTIVE 12

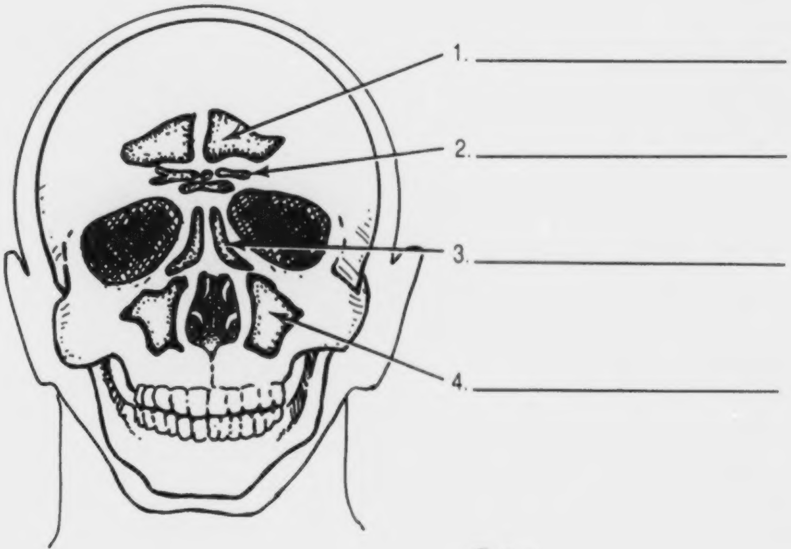
Distinguish between bones from the two basic skeletal divisions. Shade in the axial skeleton.



OBJECTIVE 13 | **Label bones of the skull and face.** Write the names in the blanks.



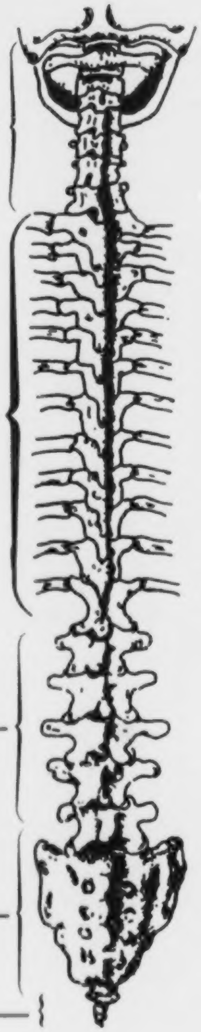
OBJECTIVE 14 | **Label sinuses found in the skull.** Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 15

Label regions of the spinal column. Write the name of the spinal region in the blank.



1. ______________________

2. ______________________

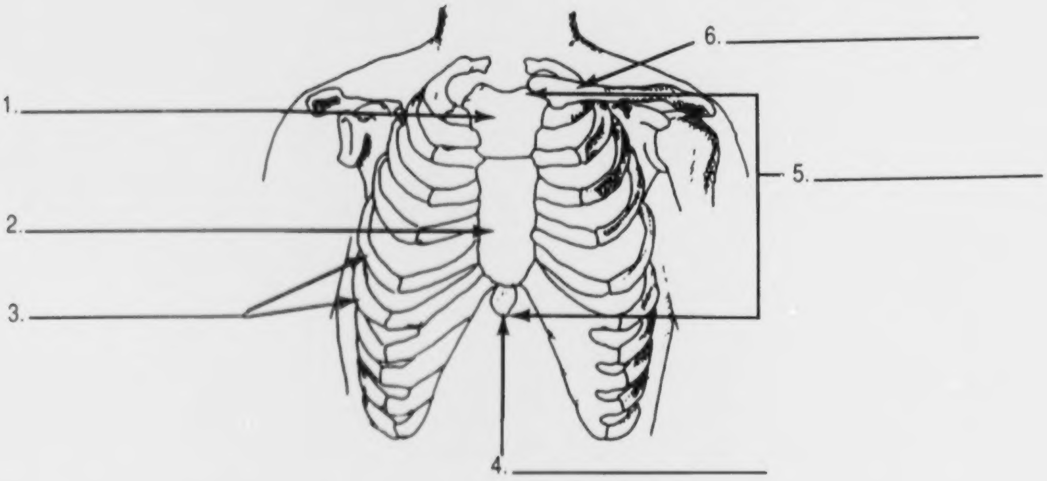
3. ______________________

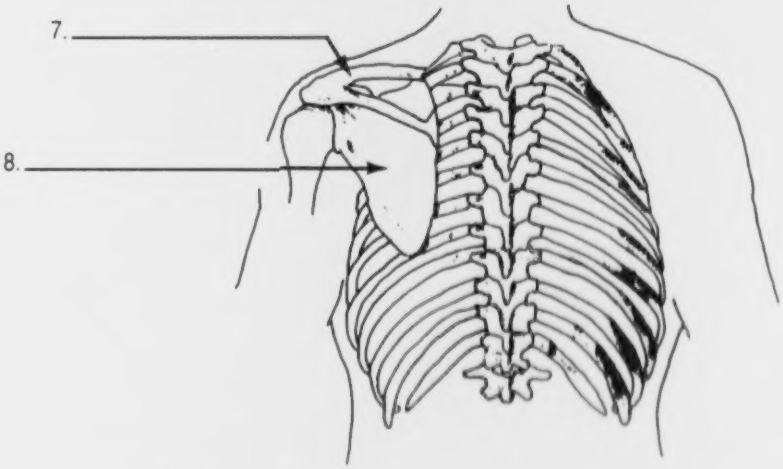
4. ______________________

5. ______________________

May be photocopied for student use.

OBJECTIVE 16 | **Label bones of the chest, upper back and shoulder.** Write the name of the bone in the blank.





OBJECTIVE 17 | **Define true ribs and false ribs.**

1. True ribs: ____

____

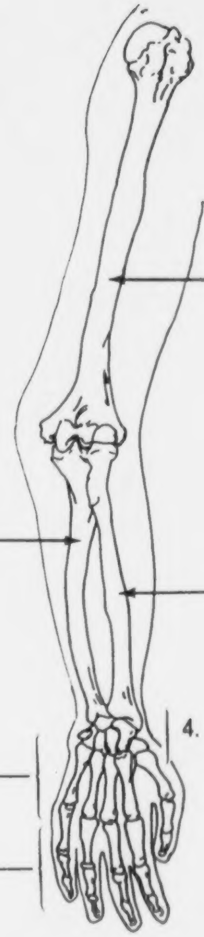
2. False ribs: ____

____

May be photocopied for student use.

296

OBJECTIVE 18 | **Label bones of the arm and hand.** Write the name of the bone in the blank.



1. ______________________

2. ______________________

3. ______________________

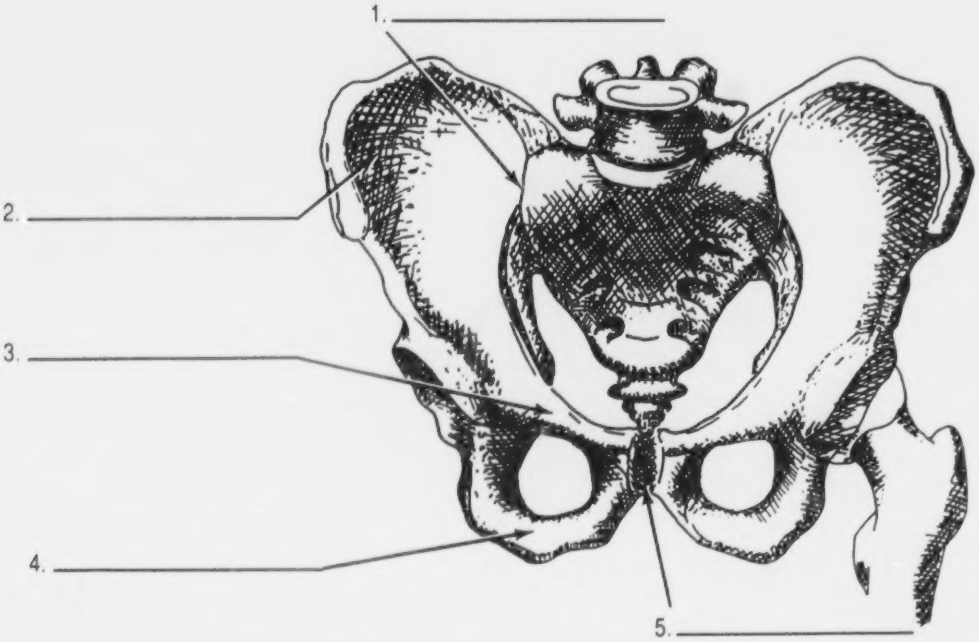
4. ______________________

5. ______________________

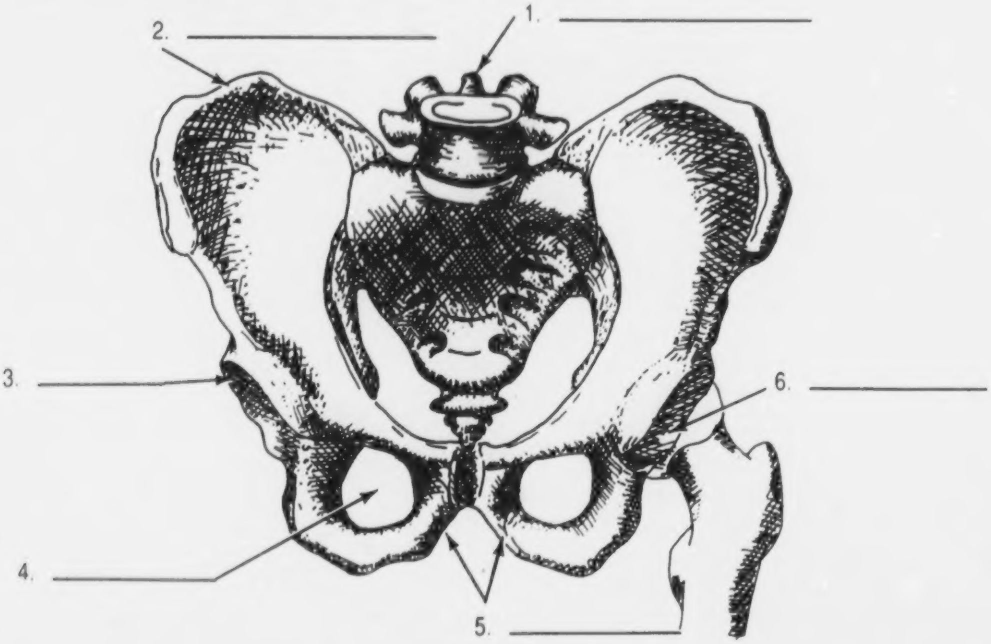
6. ______________________

May be photocopied for student use.

OBJECTIVE 19 | **Label bones of the pelvis.** Write the name of the bone in the blank.



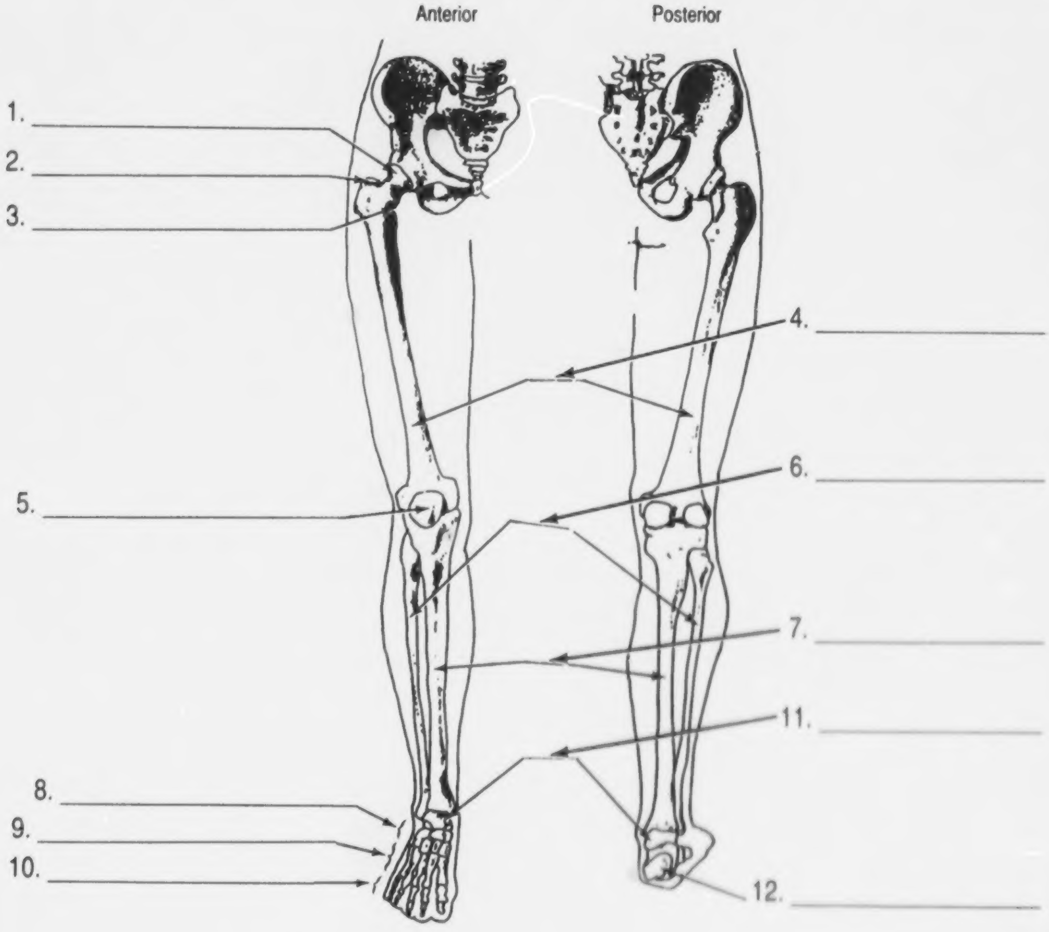
OBJECTIVE 20 | **Label bone markings of the pelvis.**



May be photocopied for student use.

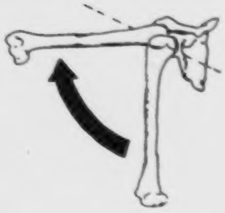
OBJECTIVE 21 **Compare male and female pelvises.** Write about differences between male and female pelvises.

OBJECTIVE 22 **Label bones in the leg and foot and their markings.** Write the words in the blanks.

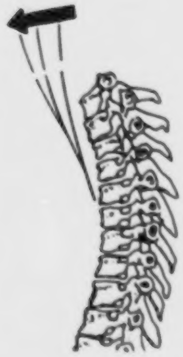

Anterior
Posterior
1.
2.
3.
4.
5.
6.
7.
11.
8.
9.
10.
12.

May be photocopied for student use.

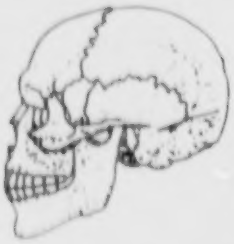
OBJECTIVE 23 | **Identify examples from the three classifications of joints.** Write the type of joint illustrated in the blank.



1. ____________________

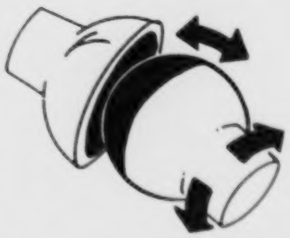


2. ____________________

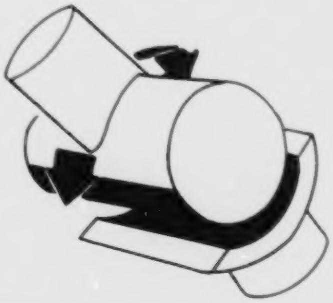


3. ____________________

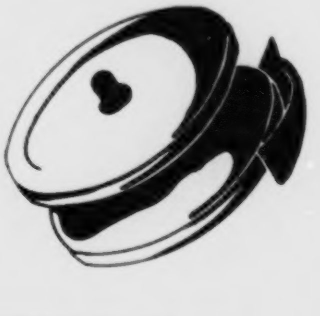
OBJECTIVE 24 | **Identify types of movable joints.** Write the name of the joint type in the blank.



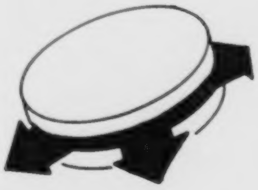
1. ____________________



2. ____________________



3. ____________________



300

4. ____________________

May be photocopied for student use

NOTE: Objective 25 is evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

OBJECTIVE 1

Part I	Part II
1. b	1. j
2. d	2. c
3. h	3. d
4. c	4. k
5. a	5. g
6. g	6. f
7. i	7. e
8. l	

OBJECTIVE 2

1. Support and shape for the body
2. Protection for internal organs
3. Movement and muscle anchorage
4. Storage of mineral supply
5. Formation of blood cells (hemopoiesis)

OBJECTIVE 3

Minerals:

1. Phosphorus
2. Calcium

Other:

1. Collagen

OBJECTIVE 4

1. B
2. B
3. A
4. B
5. A
6. B
7. A

OBJECTIVE 5

1. Y
2. Y
3. R
4. Y
5. R

OBJECTIVE 6

1, 2, 5, 6

OBJECTIVE 7

1. Maturity
2. Embryo
3. Adolescence
4. Old age
5. Childhood

OBJECTIVE 8

1. long bone
2. flat bone
3. short bone
4. irregular bone

OBJECTIVE 9

1.	g	6.	j
2.	l	7.	i
3.	f	8.	d
4.	m	9.	c
5.	a		

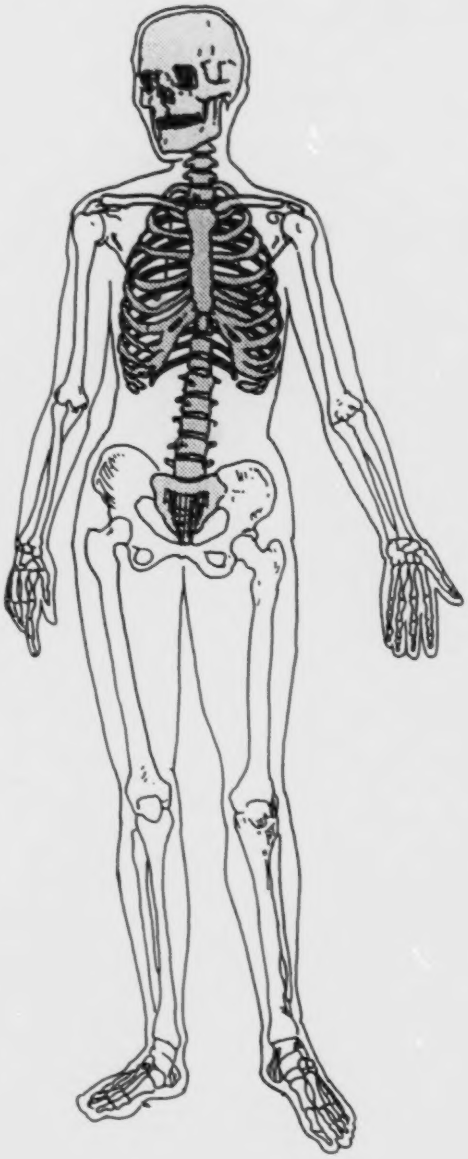
OBJECTIVE 10

1. Articular cartilage
2. Red marrow
3. Cancellous bone
4. Compact bone
5. Medullary cavity
6. Yellow marrow
7. Periosteum
8. Epiphysis
9. Diaphysis

OBJECTIVE 11

Part I		Part II	
1.	h	1.	d
2.	e	2.	c
3.	f	3.	e
4.	g	4.	f
5.	b	5.	g
		6.	a

OBJECTIVE 12



305

OBJECTIVE 13

1. Parietal bone
2. Frontal bone
3. Sphenoid bone
4. Nasal bone
5. Ethmoid bone
6. Lacrimal bone
7. Maxillary bone or maxilla
8. Mandible
9. Zygomatic bone
10. Temporal bone
11. Occipital bone

OBJECTIVE 14

1. Frontal
2. Ethmoid
3. Sphenoid
4. Maxillary

OBJECTIVE 15

1. Cervical
2. Thoracic
3. Lumbar
4. Sacral
5. Coccyx

OBJECTIVE 16

1. Manubrium
2. Body
3. Ribs
4. Xiphoid process
5. Sternum

6. Clavicle
7. Clavicle
8. Scapula

OBJECTIVE 17

1. First seven pairs, connected to the sternum
2. Next five pairs; attached to the seventh rib instead of sternum; the last two pairs are floating ribs connected to neither sternum nor seventh rib

OBJECTIVE 18

1. Humerus
2. Ulna
3. Radius
4. Carpals
5. Metacarpals
6. Phalanges

OBJECTIVE 19

1. Sacroiliac joint
2. Ilium
3. Pubis
4. Ischium
5. Symphysis pubis

OBJECTIVE 20

1. Spinous process
2. Iliac crest
3. Ischial tuberosity
4. Obturator foramen
5. Pubic arch
6. Acetabulum

OBJECTIVE 21

Comparison should include:

- Female pelvis is wider
- Female pelvic inlet is wider
- Female pelvis is lighter and smoother

OBJECTIVE 22

1. Head of the femur
2. Greater trochanter
3. Lesser trochanter
4. Femur
5. Patella
6. Fibula
7. Tibia
8. Tarsus (Tarsals)
9. Metatarsus (Metatarsals)
10. Phalanges
11. Talus
12. Calcaneus

OBJECTIVE 23

1. Diarthroses
2. Amphiarthroses
3. Synarthroses

OBJECTIVE 24

1. Gliding joint
2. Hinge joint
3. Pivot joint
4. Ball and socket joint

OBJECTIVE SHEET

THE MUSCULAR SYSTEM

VI

INTRODUCTION

From physical fitness to aching backs to the Jerry Lewis Labor Day Telethon, America associates health with the muscular system. The proper function of muscles allow us mobility and strength. We use the muscular system to enjoy sports and shape our physiques. The muscular system affects even our skeletal growth. Surprisingly, this important system is not difficult to understand.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify muscles and the muscular system, types and characteristics of muscle tissue, and the mechanisms of movement. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC

After completing this unit, the student will be able to:

1. Match terms associated with the muscular system to their definitions.
2. Distinguish among types of muscle tissues.
3. List parts of muscles.
4. Match characteristics of muscle tissue to their definitions.
5. Select from a list major functions of the muscles.
6. Label types of muscle actions.
7. List criteria to use to help remember names of muscles.
8. Identify principal skeletal muscles.
9. Describe the muscle contraction process.
10. Select from a list true statements about the muscle's role in body movement.
11. Communicate about the function of the muscular system. (Assignment Sheet)

THE MUSCULAR SYSTEM

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Decide also which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Order materials to supplement unit. Three-dimensional models of the muscles are available from Health Edco, P.O. Box 21207, Waco, TX 76702-1207.
- Invite a variety of physicians to discuss how muscles affect their specialty.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. You may want to supply the objective sheet, information sheet and any other components you want covered. Confirm the scheduled appearance 2-3 days prior to the presentation.

- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.

- Assist students in scheduling and presenting prepared and extemporaneous speeches.
- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the muscular system to their definitions.

- Discuss your expectations for student knowledge of the names of muscles.
- Review vocabulary words listed here and add to the list, as necessary.
- Relate words such as "origin" or "antagonist" to their more familiar meanings.

Objective 2: Distinguish among types of muscle tissues.

- Show students a variety of drawings of each type of muscle tissue to aid in identification.
- Allow students to view muscle types through a microscope.
- Have students relate muscle types to associated meats. For example, roasts to skeletal muscle, liver to non-striated tissue, and heart to cardiac muscle. If possible, allow them to look at the differences and have them compare the uses of the muscles.

Objective 3: List parts of muscles.

- Have students locate the origin and insertion of several muscles.
- Use Transparency Master 1 to illustrate parts of the muscle.
- Using Transparency Master 4, describe how muscles move bones.

Objective 4: Match characteristics of muscle tissue to their definitions.

- Relate the muscle abilities to common items such as elastic.
- Determine which abilities are used most extensively in each muscle type.
- Relate the abilities to the functions of different muscles.

Objective 5: Select from a list major functions of the muscles.

- Compare muscular and skeletal functions. Discuss similarities and how they complement each other.
- Discuss the importance of each function and have students brainstorm on diseases that affect each one.

Objective 6: Label types of muscle actions.

- Compare muscle actions and joint types.
- Have students demonstrate each muscle action.
- Have students discuss how each movement is made, which muscles are contracted and which are relaxed.

Objective 7: List criteria to use to help remember names of muscles.

- Begin with common muscles and determine what the name refers to.
- As students become more familiar with criteria, list muscle names they are not familiar with and have them list what they can determine about the muscle simply from the name.

Objective 8: Identify principal skeletal muscles.

- Have students color the muscles. Suggest that they try to color each muscle a different color, but allow no fewer than four colors per illustration. This will help students distinguish one muscle from another.
- Use Transparency Masters 2 and 3 to identify muscles in a full-body view.
- Have students locate each muscle on their own bodies.
- Comic book super-heros are usually anatomically correct, if exaggerated. Have students locate a drawing of their favorite super-hero and identify the name of each muscle bulge.

Objective 9: Describe the muscle contraction process.

Objective 10: Select from a list five statements about the muscle's role in body movements.

- As students discuss the mechanisms of muscle movement, have them compare the function and type of muscle.
- Use Transparency Master 4 to discuss mechanisms of movement.
- Discuss the relationships among the nervous, skeletal, and muscular systems.

APPLICATION

Objective 11: Communicate about the function of the muscular system.

- Have students complete the assignment sheet to research and promote the healthy functioning of the muscular system.
- Encourage a wide array of topics.
- Use topics as a basis for HOSA-related activities.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

The following materials are available from Opportunities for Learning, 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, Ohio 44901-8103, 1-419-589-1700:

- *Anatomy and Physiology Filmstrip Series, Unit 4, The Muscular System.* Filmstrip with instructor's guide.
- *Human Systems Filmstrip Series, Muscular System in the Human Body.* Filmstrip with cassette and student self-instruction book.
- *Systems of the Body Filmstrip Set.* A 4-filmstrip series includes sections on the Skeletal and Muscular, Nervous and Respiratory, Circulatory and Lymphatic, and Digestive and Excretory systems.
- *Your Body Video and Filmstrip Series; Your Body: Series 1.* Comes with teacher's guide and covers cells, tissues, and systems: the skeletal and muscular systems. (VHS, 50 minutes)

Software

The following materials are available from Opportunities for Learning, 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, Ohio 44901-8103, 1-419-589-1700:

- *Body in Focus.* Software program allows students to explore the body, layer-by-layer. Includes graphics that simulate body movement and functions, review tests keyboard overlay, and program guide. For use on IBM and Apple computers, 48K.
- *Mechanical Properties of Active Muscle Software.* Includes manual, simulations of muscle functions, and a game-like lesson on various mechanisms. For use on IBM, 256K.
- *The Human Body: An Overview.* Includes graphics, multiple choice, true-false, and short answer questions to review system functions. For use on Apple computers, 48K.
- *The Human Systems Software Series.* Includes lesson planner, educational objectives, program sequences, and scoring criteria. For Apple computers, 48K.

UNIT REFERENCES

- *Allied Health Careers.* Oklahoma State Board of Vocational and Technical Education, Stillwater, Oklahoma, 1987.
- Elizabeth Fong, Elvira B. Ferris, and Esther G. Skelley. *Body Structure and Functions.* Delmar Publishers, Albany, New York,. 1989.
- Rosdahl, Caroline Bunker, *Textbook of Basic Nursing.* J.B. Lippincott Co., Philadelphia, 1981.

OBJECTIVE 1

Match terms associated with the muscular system to their definitions.

- **antagonists** – muscles in the group that oppose the action of the prime mover and that must be relaxed so that movement may take place
- **atrophy** – wasting away; degeneration
- **flaccid** – lacking tone in muscle
- **insertion** – the place of attachment of a muscle to a bone so movement can take place

  NOTE: When a muscle contracts, the insertion is pulled toward the origin.
- **isometric** – contractions in which the muscles cannot shorten and movement is prevented

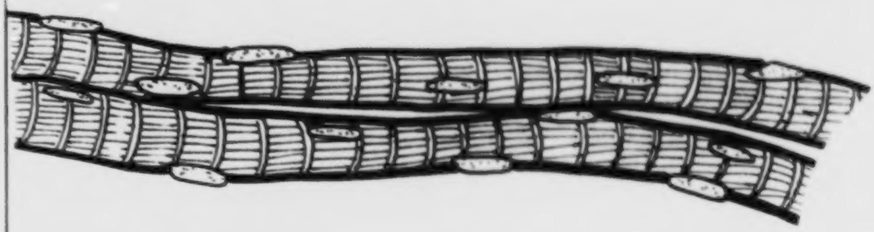
  EXAMPLE: Trying to lift a heavy object, pushing against a wall.
- **isotonic** – contractions in which the muscles contract and shorten

  EXAMPLE: Smiling and sitting
- **muscle fatigue** – loss of power to contract after prolonged periods of muscle contraction
- **myology** – the study of muscles
- **origin** – the more fixed attachment of the muscle; the beginning
- **prime movers** – muscles that initiate movement
- **synergists** – muscles that assist the prime movers by stabilizing the joint
- **tendon** – a narrow strip of dense, connective tissue that attaches a muscle to a bone

OBJECTIVE 2

Distinguish among types of muscle tissue.

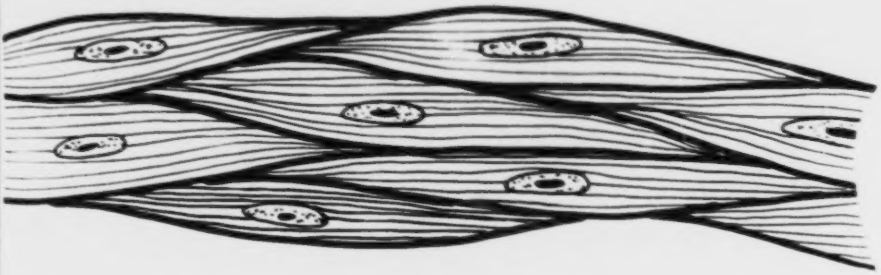
Skeletal or striated



- Found attached to the skeleton and in the walls of the pharynx and esophagus
- Comprises 40% of body weight
- Sometimes called voluntary muscle

  NOTE: Skeletal muscles are called "voluntary" because they are controlled by will.
- Made up of several fibers, each containing a muscle cell
- Responsible for movement of the bones
- Capable of sudden, powerful, sustained contractions

Smooth or non-striated



- Found in the walls of hollow or tubular structures in the body

  EXAMPLES: Stomach, intestines
- Sometimes called visceral, or involuntary, muscle

NOTE: Visceral muscles are called involuntary because they are controlled by signals from the nervous system, not by conscious will.

- Made up of fibers in flat sheets that have cells with one nucleus
- Form layers of the walls of hollow organs and blood vessels
- Responsible for slower, sustained contractions needed in digestion and circulation of body fluids

Cardiac

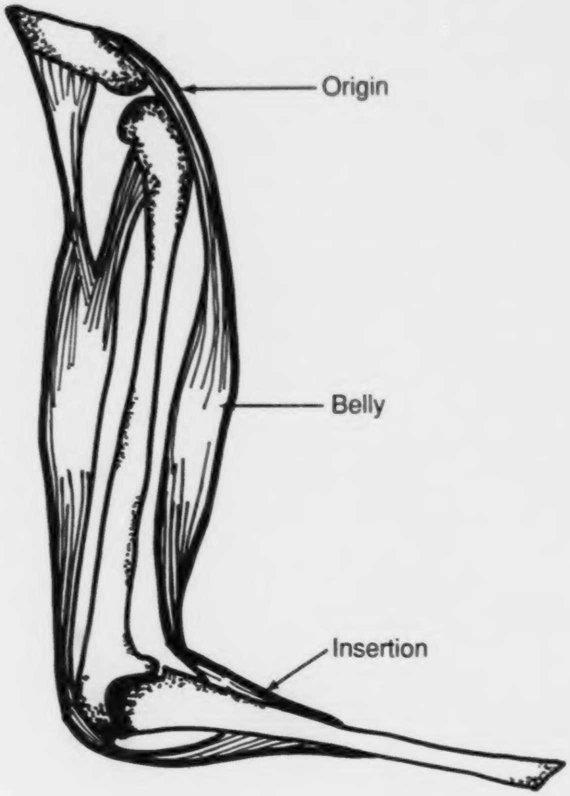
- Found only in the heart
- Fibers divide and interconnect, but each has a separate cell
- Form the majority of the heart wall
- Involuntary action

OBJECTIVE 3 **List parts of muscles**

- Origin

  NOTE: The origin is usually the end of the muscle closest to the trunk.

- Body or belly
- Insertion



OBJECTIVE 4

Match characteristics of muscle tissue to their definitions.

- **contractility** – ability to contract or shorten
- **elasticity** – ability to return to the original size and shape after being stretched
- **extendibility** – ability to stretch or lengthen
- **irritability** – ability to respond to a stimulus
- **tonus** – slight tension in muscle, present at all times to allow muscles to act more easily and quickly

OBJECTIVE 5 **Select from a list major functions of the muscles.**

- Movement

  NOTE: Muscles allow for movement from one place to another, for small refined movements, such as adjustment of pupil to light, and for internal movement, such as moving of blood through vessels.)

- Production of heat and energy that result from a chemical reaction

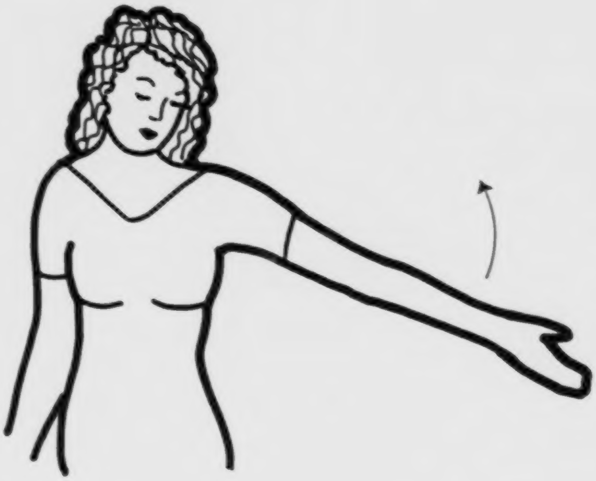
- Maintenance of posture, balance, and body mechanics

  NOTE: Muscles function with bones, joints, nerves, and the brain to maintain balance and posture and to allow the body to run, lift, sit, stand, walk, and bend.

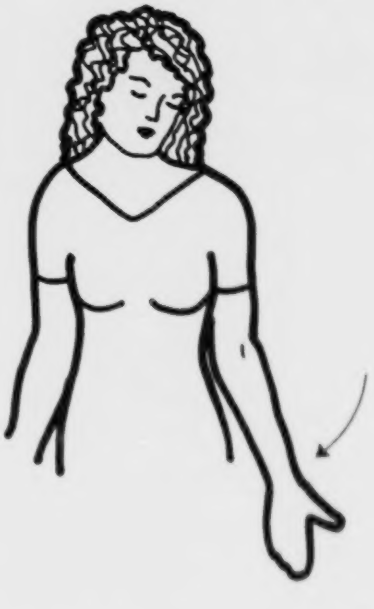
- Protection of internal organs

OBJECTIVE 6 **Label types of muscle actions.**

- **Abduction** – Away from a part

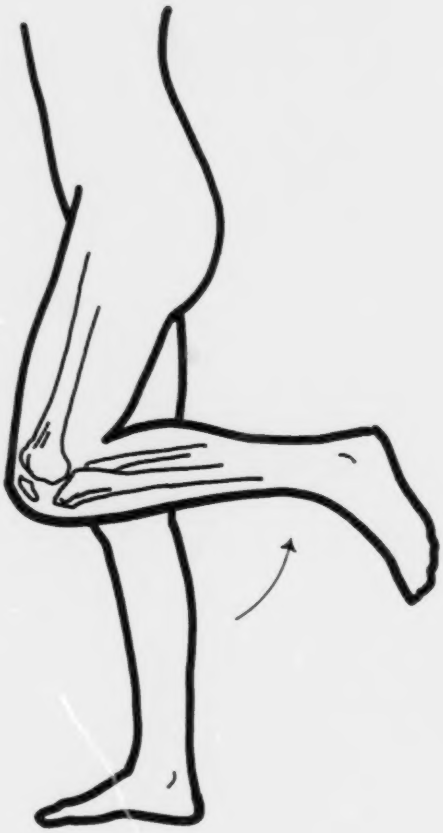


- **Adduction** – Toward a part or midline

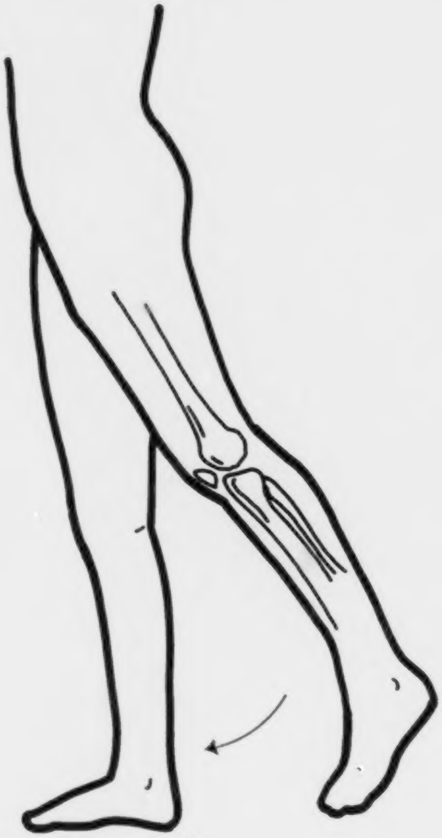


320

- **Flexion** – Bends a joint

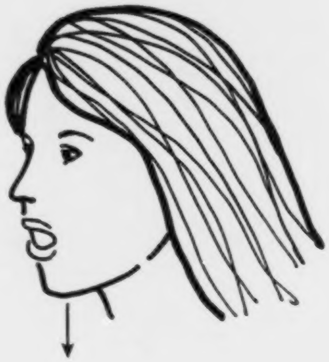


- **Extension** – Straightens a joint

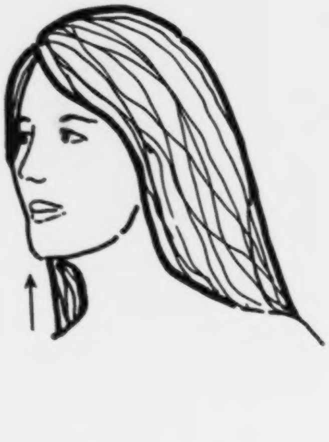


322

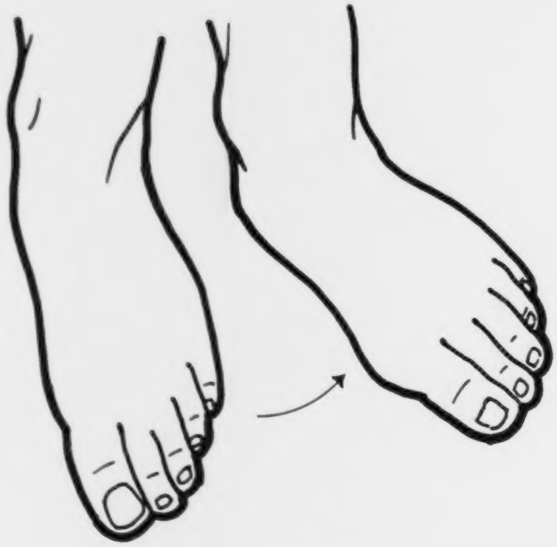
- **Depression** – Lowers a part



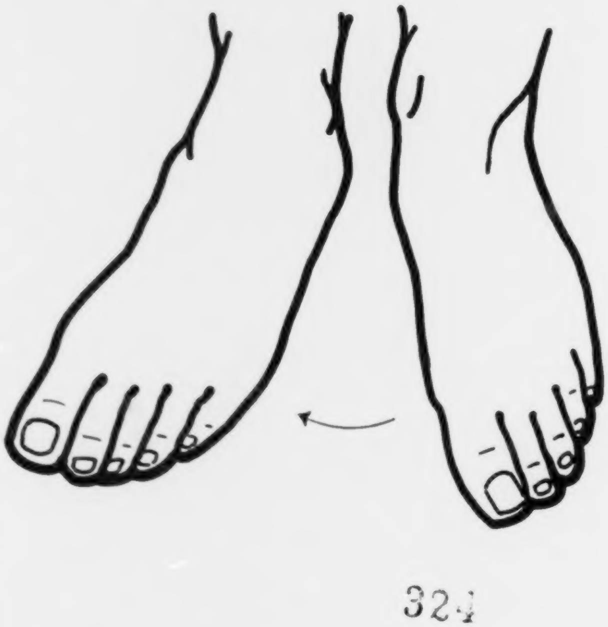
- **Elevation** – Lifts a part



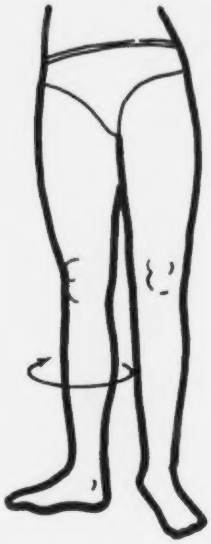
- **Eversion** – Turns a part outward



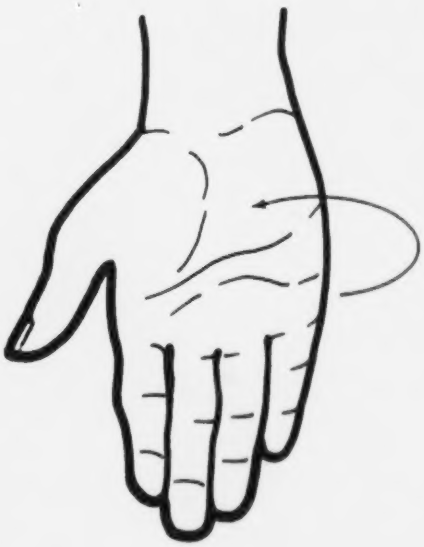
- **Inversion** – Turns a part inward



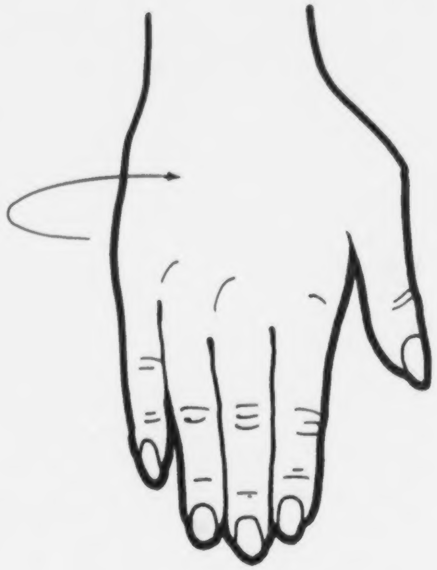
- **Rotation** – Moves a part around an axis



- **Supination** – Moves the hand so that the palm is up



- **Pronation** – Moves the hand so that the palm is down



OBJECTIVE 7

List criteria to use to help remember names of muscles.

- **Action**

  EXAMPLE: *Depressor* anguli oris

- **Shape**

  EXAMPLE: *Trapezius* capitis

- **Origin and insertion**

  EXAMPLE: *Biceps* brachii

- **Division number**

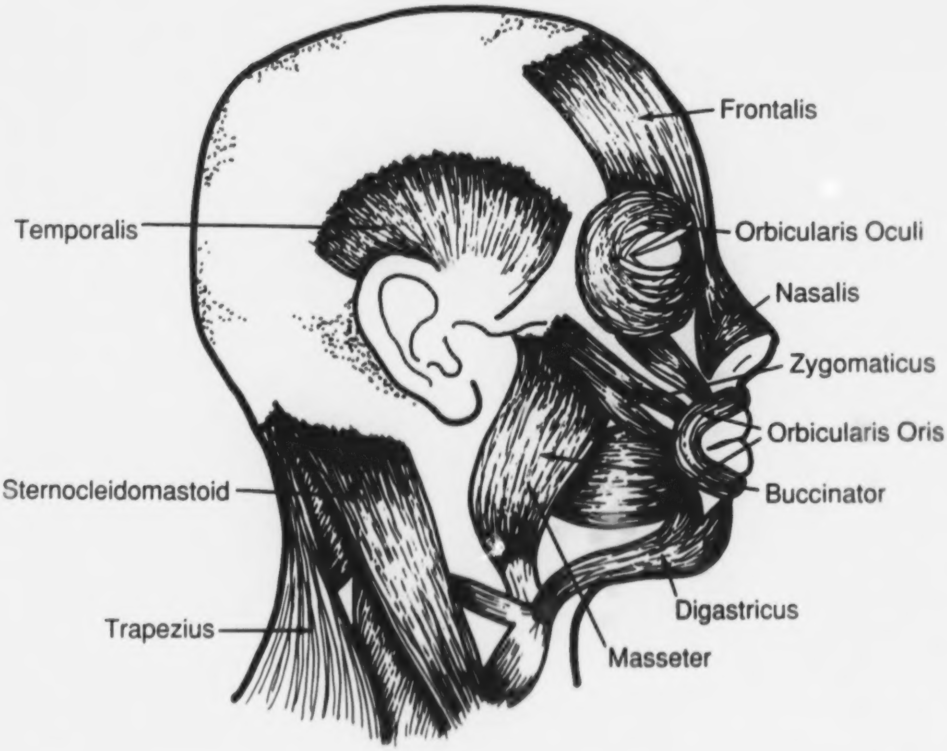
  EXAMPLE: *Tri*ceps brachii

- **Direction of fibers**

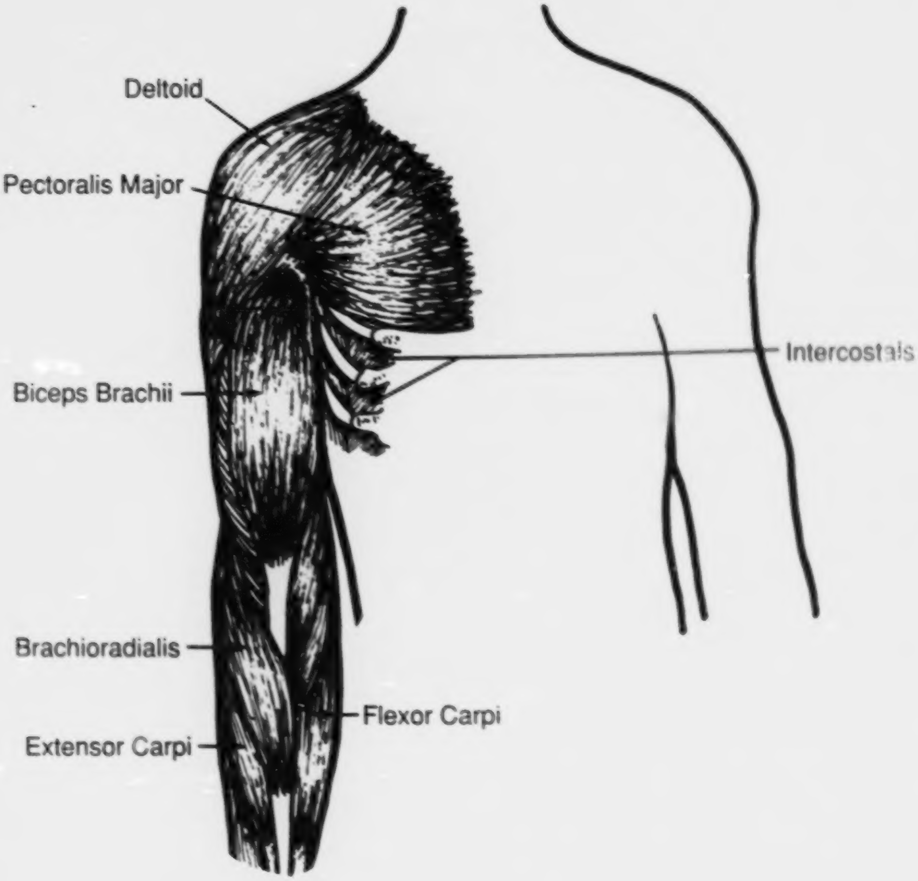
  EXAMPLE: *Transverse* abdominis

OBJECTIVE 8 | **Identify principal skeletal muscles.**

- **Head and neck**

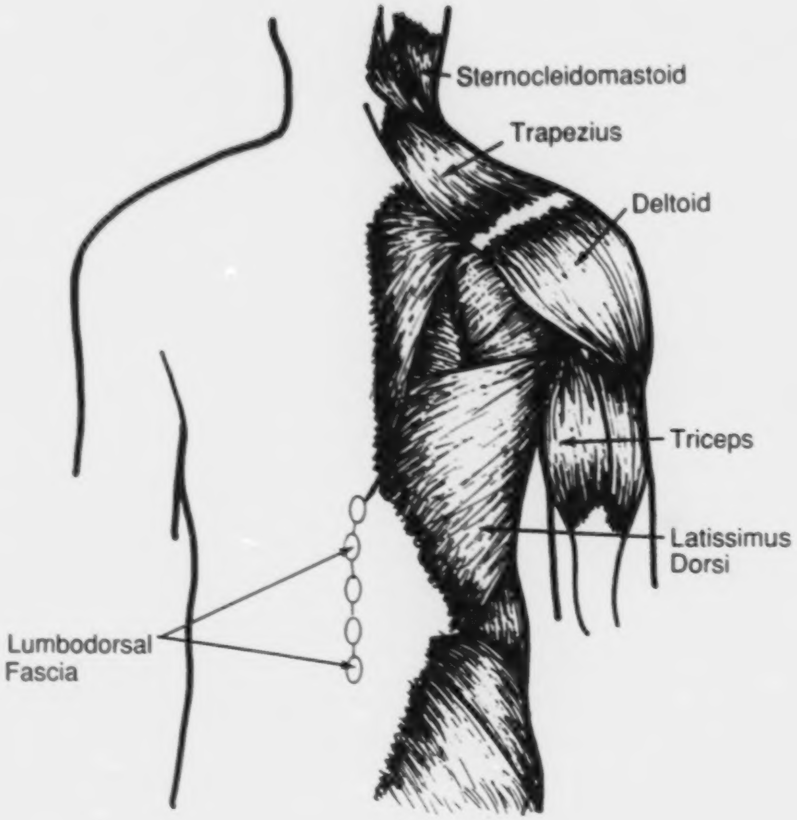

Frontalis
Temporalis
Orbicularis Oculi
Nasalis
Zygomaticus
Orbicularis Oris
Sternocleidomastoid
Buccinator
Digastricus
Trapezius
Masseter

- **Chest and arm**

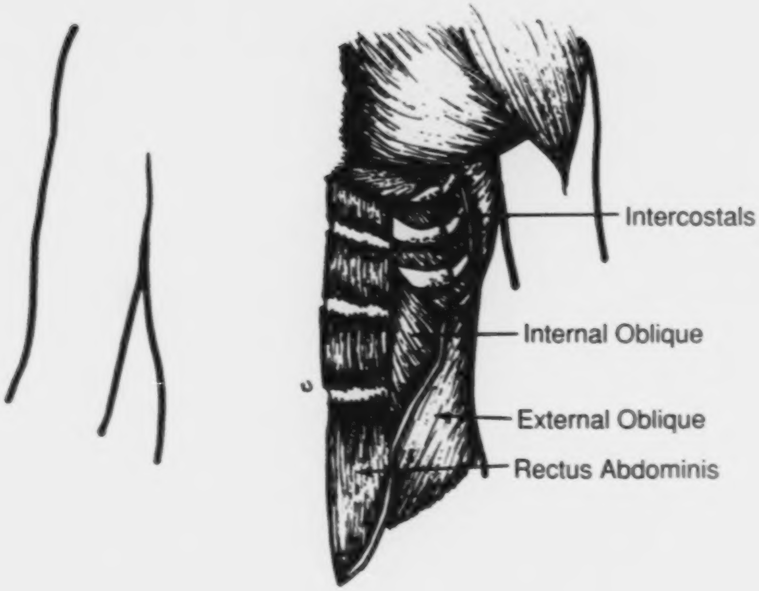

Deltoid
Pectoralis Major
Intercostals
Biceps Brachii
Brachioradialis
Flexor Carpi
Extensor Carpi

328

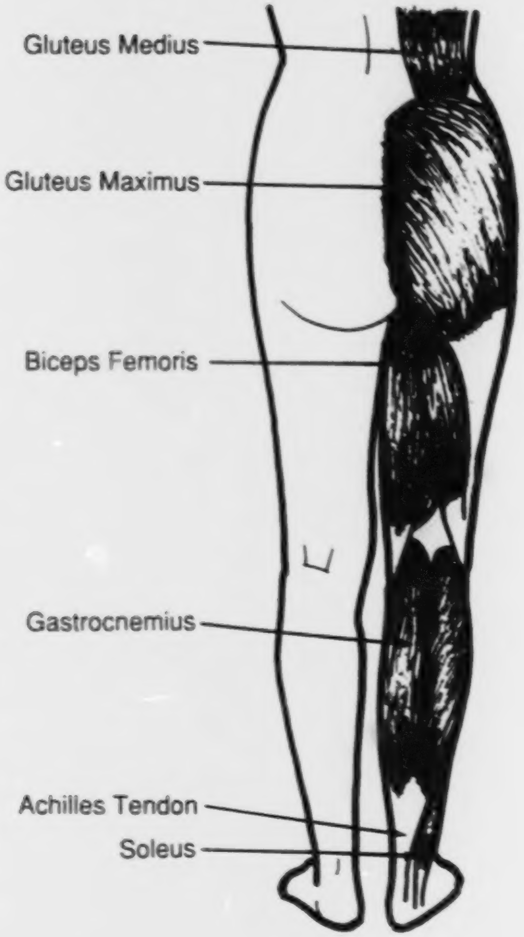
- **Back**


Sternocleidomastoid
Trapezius
Deltoid
Triceps
Latissimus Dorsi
Lumbodorsal Fascia

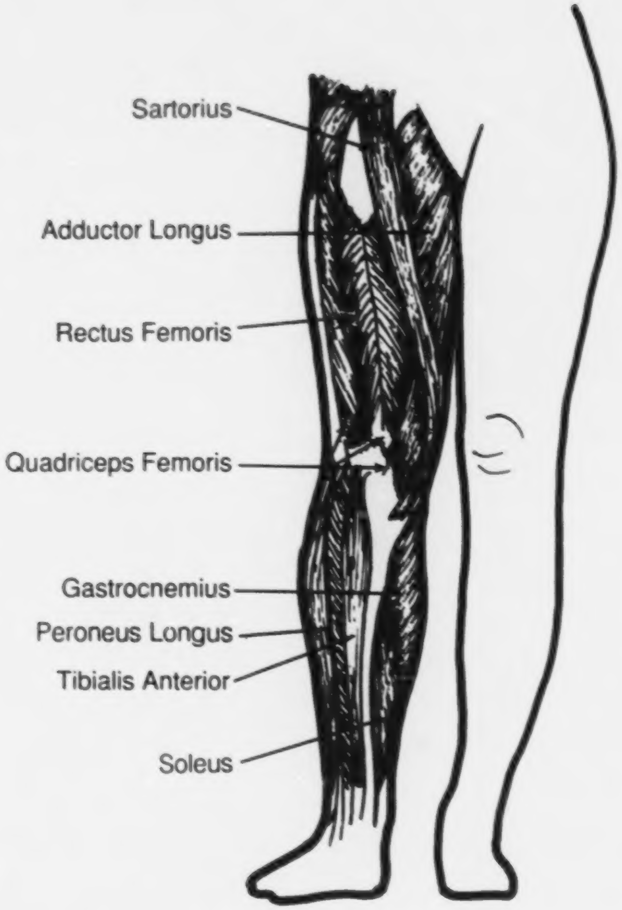
- **Abdomen**


Intercostals
Internal Oblique
External Oblique
Rectus Abdominis

- **Buttocks and posterior leg**


Gluteus Medius
Gluteus Maximus
Biceps Femoris
Gastrocnemius
Achilles Tendon
Soleus

- **Anterior leg**


Sartorius
Adductor Longus
Rectus Femoris
Quadriceps Femoris
Gastrocnemius
Peroneus Longus
Tibialis Anterior
Soleus

OBJECTIVE 9 **Describe the muscle contraction process.**

1. Messages are sent to nerves near the muscles.
2. The messages are spread to the neuromuscular junction (the point at which the nerves come closest to the muscles).
3. The nerve endings produce ATP.
4. ATP travels from the nerve cells to the muscle cells.
5. The ATP attaches to muscle cells, allowing positive sodium ions into the muscle cell wall.
6. The positive charge spreads through the cell wall.
7. The muscle cell contracts.

8. Calcium ions are released, causing the cell to shorten.

9. When the ATP production stops, cell contract ends, the cell expands to its normal size, and the calcium is reabsorbed.

OBJECTIVE 10

Select from a list true statements about the muscle's role in body movement.

Muscle contraction

- Muscle movement begins with contractions in each muscle cell, brought about by a chemical reaction.

- Cells are controlled by the "All or None Law." When a cell receives the message to contract, it must contract fully.

  NOTE: Muscles can contract "isometrically" or "isotonically." During isometric contractions, muscles attempt to shorten, but cannot. An example of isometric contraction is the muscle tightening when you push against a wall. Isotonic contraction occurs when muscles shorten, such as when you bend a knee or arm.

Body movement

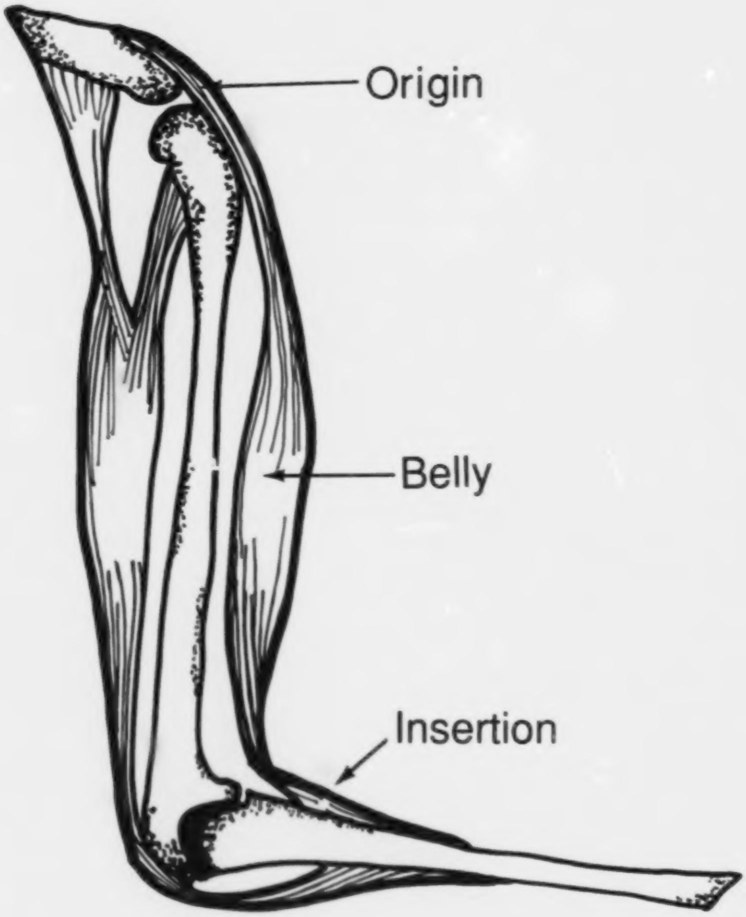
- Each muscle is attached to at least two points. One point, the origin, is where the muscle connects to an immovable (or less movable) bone. The other point, the insertion, is where the muscle is attached to a movable bone.

- When the muscle cells contract, the muscle contracts, and the insertion is moved toward the origin.

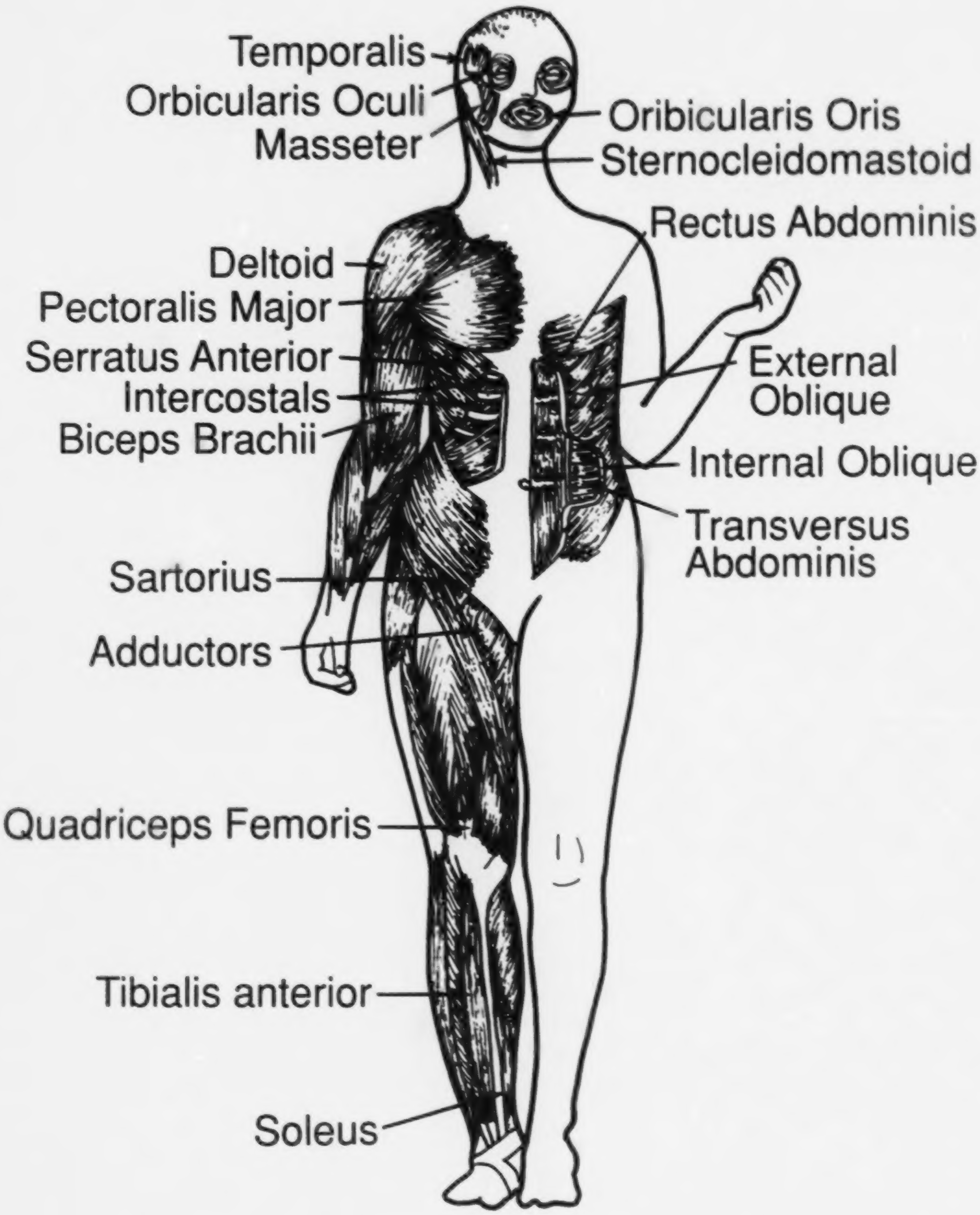
- An opposing muscle contracts to straighten the joint or bone.

- Differences in speed or degree of movement are determined by the speed and degree of cellular contraction. When more cells contract. the contraction is greater. When the message to contract is spread quickly, the muscles react quickly.

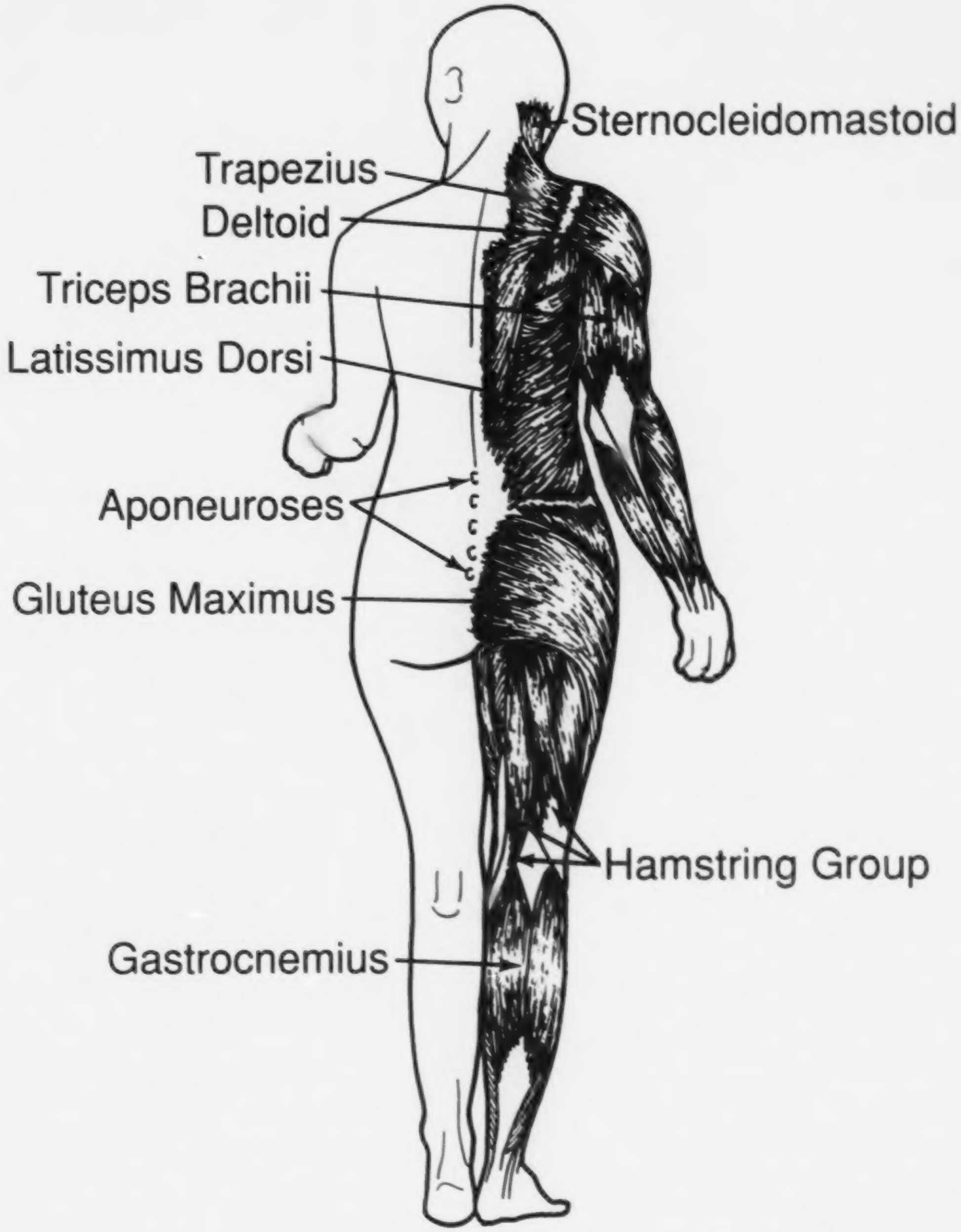
Parts of a Muscle


Origin
Belly
Insertion

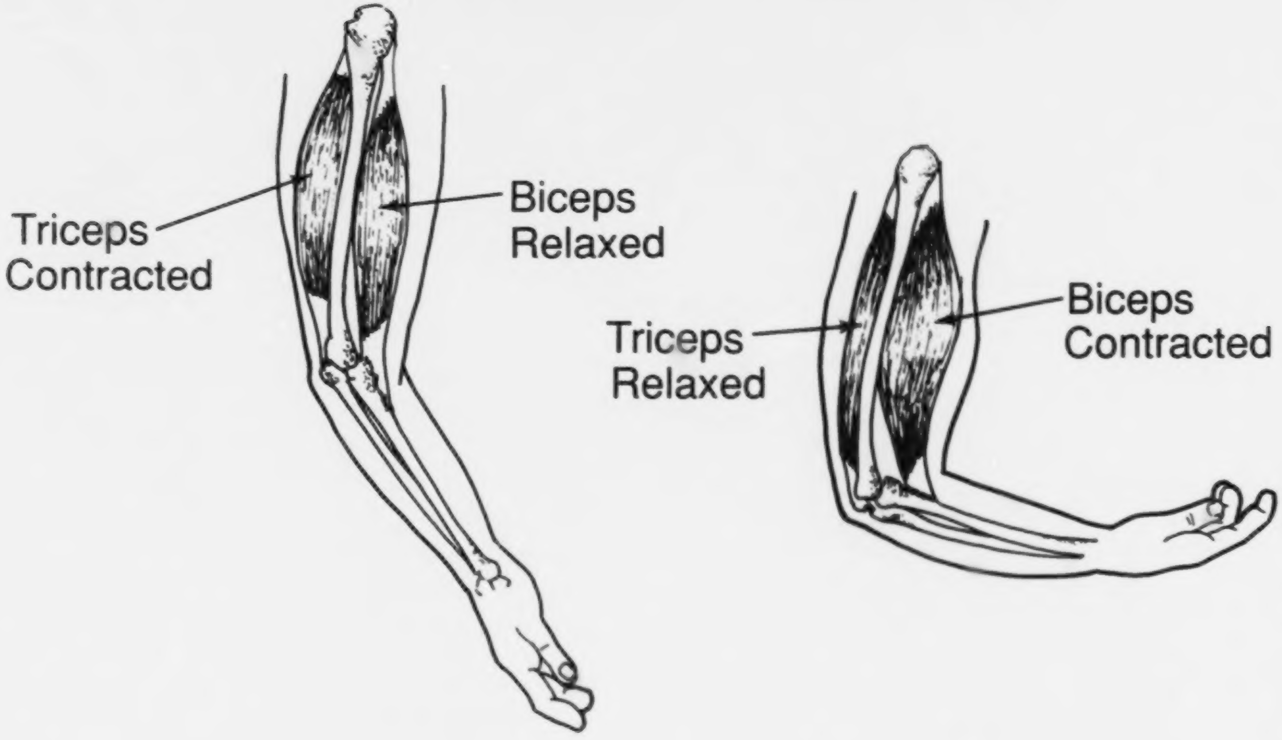
Muscles Anterior View


Temporalis
Orbicularis Oculi
Masseter
Oribicularis Oris
Sternocleidomastoid
Rectus Abdominis
Deltoid
Pectoralis Major
Serratus Anterior
Intercostals
Biceps Brachii
External Oblique
Internal Oblique
Transversus Abdominis
Sartorius
Adductors
Quadriceps Femoris
Tibialis anterior
Soleus

Muscles Posterior View


Sternocleidomastoid
Trapezius
Deltoid
Triceps Brachii
Latissimus Dorsi
Aponeuroses
Gluteus Maximus
Hamstring Group
Gastrocnemius

Coordination of Antagonistic Muscles



Triceps Contracted

Biceps Relaxed

Triceps Relaxed

Biceps Contracted

Extension

Flexion

TRANSPARENCY MASTER 4 · Body Structure and Function
CIMC · VI · 35

ASSIGNMENT SHEET

Development of:
READING SKILLS
WRITING SKILLS
ORAL COMMUNICATION SKILLS
GENERAL RELATING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading, writing, oral communication, interpersonal or relating skills, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Select useful resources

  WRITING SKILLS

  - Take notes

  ORAL COMMUNICATION SKILLS

  - Use good speaking techniques
  - Make informative presentations

  INTERPERSONAL OR RELATING SKILLS

  - Interact with family/friends

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Predict results/outcomes

- If students have difficulty selecting resources:

  - Review with them the different types of resources available to them. Have volunteers tell which type of information can be found in each resource type and what types of projects each resource is helpful with.

  - Help them learn how to locate each resource in libraries, resource centers, or media centers.

- If students have difficulty taking notes:

  - Remind them that they take notes as they read so that when they are ready to prepare the final product, they will have the information they need in an easy to use format. Explain that because the notes they take are for their own use, they should develop their own note-taking style.

  - Have students volunteer to discuss some of their own note-taking tricks and techniques. Suggest that others may wish to experiment with some of these techniques.

  - Remind the students that they should always take notes in their own words instead of copying directly from the original source. This makes it easier when it is time to prepare the final project.

- If students have difficulty using good speaking techniques:

  - Remind them to speak clearly; their voices should be loud enough to be heard, but not so loud to be offensive.

  - Suggest that they practice before doing the actual presenting. Practicing in front of a mirror helps many presenters.

  - Discuss with the group the importance of knowing their information so that their speech is smooth, without long pauses or frequent "eh's." Remind them to stress important facts by slowing down or speaking louder. It is also good to repeat or summarize important points.

- If students have difficulty making informative presentations:

  - Remind them to carefully plan what they want to say and how they want to say it. Suggest that they think about the intended audience as they plan.

  - For additional suggestions about making informative presentations, use the refer to the suggestions for good speaking techniques and stating ideas clearly also found on this Instructional Supplement.

- If students have difficulty interacting with family/friends:

  - Remind them that one of the keys to getting along and successfully interacting with family and friends is cooperation and compromise. Suggest that they be ready to present their ideas and thoughts to the group, but that they also be ready to listen to other people's ideas and thoughts.

  - Remind them to be an active, cooperative, thoughtful participant in any group situation. Remember that the best group member does his or her part, but does not try to do everyone else's part.

- If students have difficulty predicting results/outcomes, remind them to carefully examine what has already happened before deciding what will happen. Explain that they will use what they already know when predicting results or outcomes. To provide practice, ask questions such as what will happen if water is left running in the bathtub. The students might enjoy making up situations for the other students to predict.

ASSIGNMENT SHEET

THE MUSCULAR SYSTEM

VI

Name ______________________ Score __________

OBJECTIVE 11

Communicate about the function of the muscular system.

INTRODUCTION

The muscular system is affected by almost everything we do. Diet, posture, stress, sleep, exercise, and illness are just a few things that can increase or decrease the functioning of the muscular system.

DIRECTIONS

1. Choose one of the topics below.
2. Read at least three articles on your topic.
3. With your family, follow guidelines suggested in your research for one week.
4. Present a 3-5 minute oral report of your research findings, your experiences, and how it did (or did not) affect the way you feel.
5. Predict the benefits of continuing the program you have followed.

Topics:

- The effect of diet on muscles
- Isometric exercises
- Massage or myotherapy
- Stretching exercises
- Aerobics
- Stress reduction techniques
- Yoga
- Exercises to strengthen the back
- Regularly sleeping 8-10 hours per night

Research and Reference Skills
- Select useful resources

Research Skills
- Take notes

Oral Presentation Skills
- Make informative presentations
- Use good speaking techniques (pitch, volume, rate, inflection)

General Relating Skills
- Interact with family/friends

Cognitive Activities Skills
- Predict results/ outcomes

- Posture
- The effect of multi-vitamins on muscles and general health
- Swimming or under-water exercise

THE MUSCULAR SYSTEM

ASSIGNMENT SHEET

Score should reflect the amount of research and application which took place during the week; the student's choice of information to share with the class; and the professionalism of the student's report.

WRITTEN TEST

THE MUSCULAR SYSTEM

VI

Name ______________________________ Score ____________

OBJECTIVE 1

Match terms associated with the muscular system to their definitions. Write the correct letter in the blank.

Part I

_____ 1. Wasting away; degeneration

_____ 2. The place of attachment of a muscle to a bone so movement can take place

_____ 3. The more fixed attachment of the muscle; the beginning

_____ 4. Muscles in the group that oppose the action of the prime mover and that must be relaxed so that movement may take place

_____ 5. Muscles that assist the prime movers by stabilizing the joint

_____ 6. A narrow strip of dense, connective tissue that attaches a muscle to a bone

a. antagonists

b. atrophy

c. insertion

d. isometric

e. isotonic

f. origin

g. myology

h. synergists

i. tendon

May be photocopied for student use

Part II

_____ 1. The study of muscles

_____ 2. Lacking tone in muscle

_____ 3. Loss of power to contract after prolonged periods of muscle contraction

_____ 4. Muscles that initiate movement

_____ 5. Contractions in which the muscles contract and shorten

_____ 6. Contractions in which the muscles cannot shorten and movements is prevented

a. atrophy
b. flaccid
c. insertion
d. isometric
e. isotonic
f. muscle fatigue
g. myology
h. prime movers
i. tendon

OBJECTIVE 2

Distinguish among types of muscle tissues. Write an "SK" in the blanks before skeletal or striated tissue, an "SM" before a smooth or non-striated tissue, and a "C" before cardiac tissue.

_____ 1. Form the majority of the heart wall

_____ 2. Sometimes referred to as visceral, or involuntary, muscle

_____ 3. Made up of several fibers, each containing a muscle cell

_____ 4. Fibers divide and interconnect, but each has a separate cell

_____ 5. Sometimes referred to as voluntary muscle

_____ 6. Form layers of the walls of hollow organs and blood vessels

_____ 7. Made up of fibers in flat sheets that have cells with one nucleus

_____ 8. Responsible for movement of the bones

_____ 9. Found only in the heart

_____ 10. Responsible for slower, sustained contractions needed in digestion, circulation of body fluids

_____ 11. Found attached to the skeleton, and in the walls of the pharynx and esophagus

May be photocopied for student use.

_____ 12. Capable of sudden, powerful, sustained contractions

OBJECTIVE 3

List parts of muscles.

1. ____

2. ____

3. ____

OBJECTIVE 4

Match characteristics of muscle tissue to their definitions. Write the correct letters in the blanks.

_____ 1. Ability to stretch or lengthen

_____ 2. Ability to contract or shorten

_____ 3. Slight tension in muscle, present at all times to allow muscle to act more easily and quickly

_____ 4. Ability to return to original size and shape after being stretched

_____ 5. Ability to respond to a stimulus

a. contractility

b. elasticity

c. extendibility

d. flaccidity

e. irritability

f. responsiveness

g. tonus

h. viability

OBJECTIVE 5

Select from a list major functions of muscles. Write an "X" in the blanks before major functions.

_____ 1. Protection of internal organs

_____ 2. Distribution of growth hormones

_____ 3. Maintain skeletal tension

_____ 4. Production of heat and energy that result from a chemical reaction

_____ 5. Movement

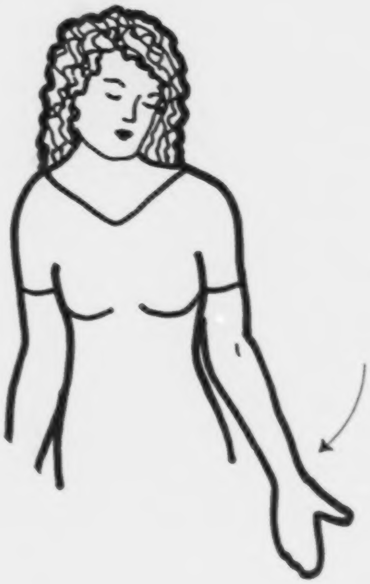
_____ 6. Insulation of the body

_____ 7. Maintenance of posture, balance, and body mechanics

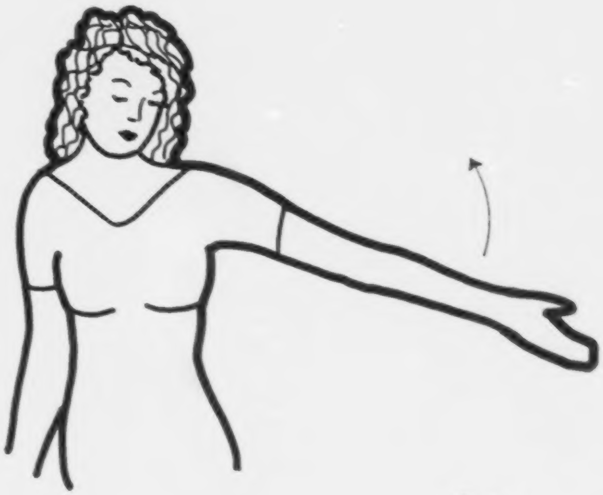
May be photocopied for student use.

OBJECTIVE 6

Label types of muscle actions. Write the correct action in the blanks.

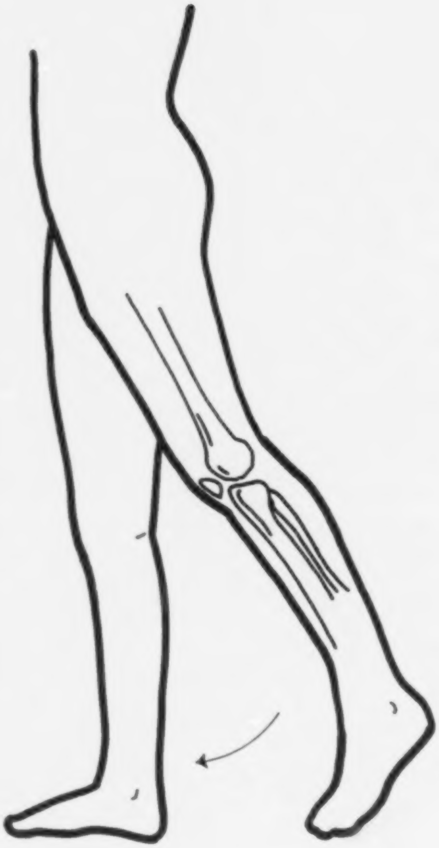


1. ________________



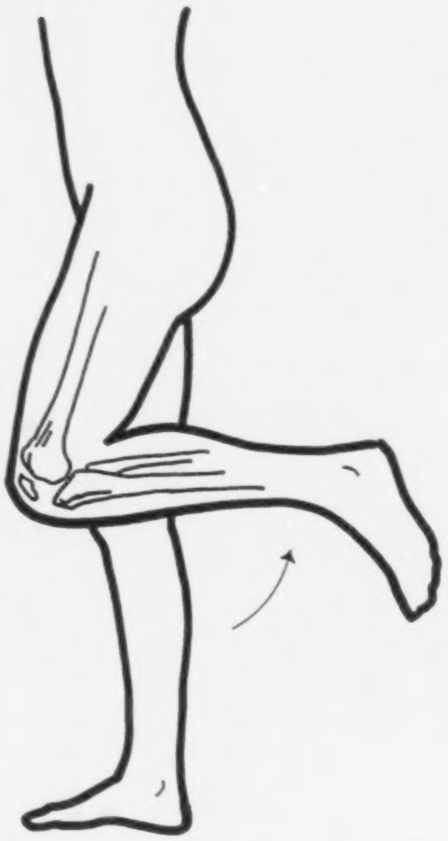
2. ________________

May be photocopied for student use



3. ______________

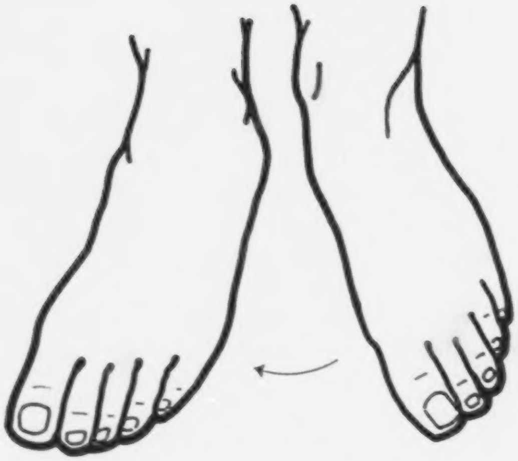
May be photocopied for student use.



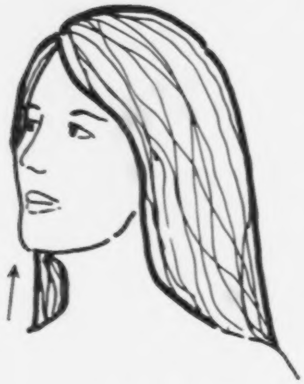
4. ____________________

350

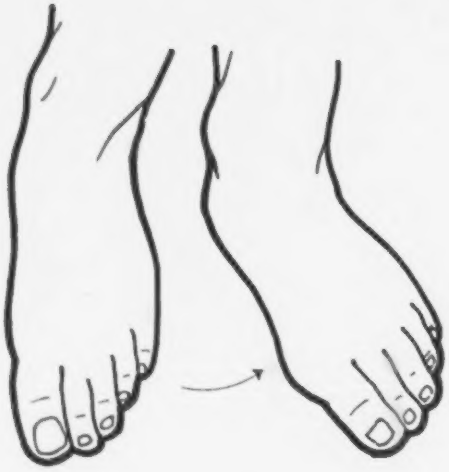
May be photocopied for student use.



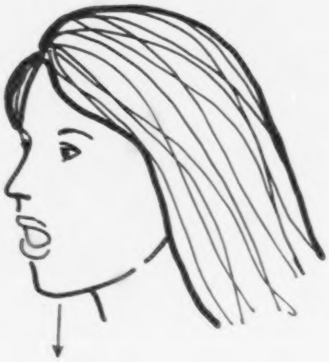
5. ____________________



7. ____________________

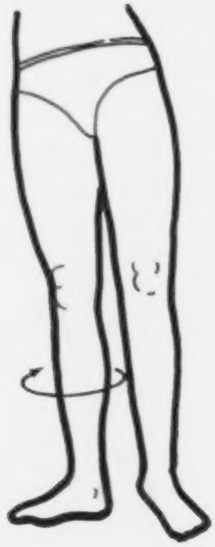


6. ____________________

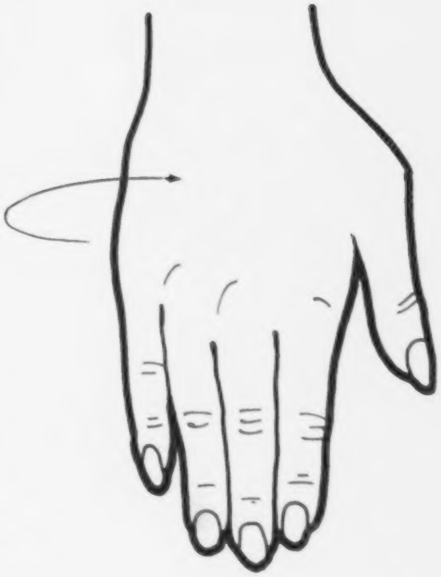


8. ____________________

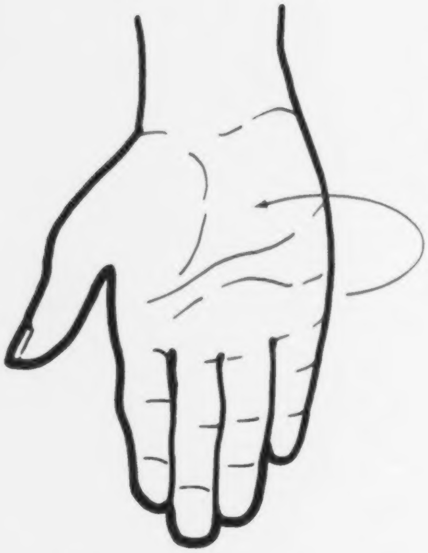
May be photocopied for student use.



9. ________________



10. ________________



11. ________________

May be photocopied for student use.

OBJECTIVE 7

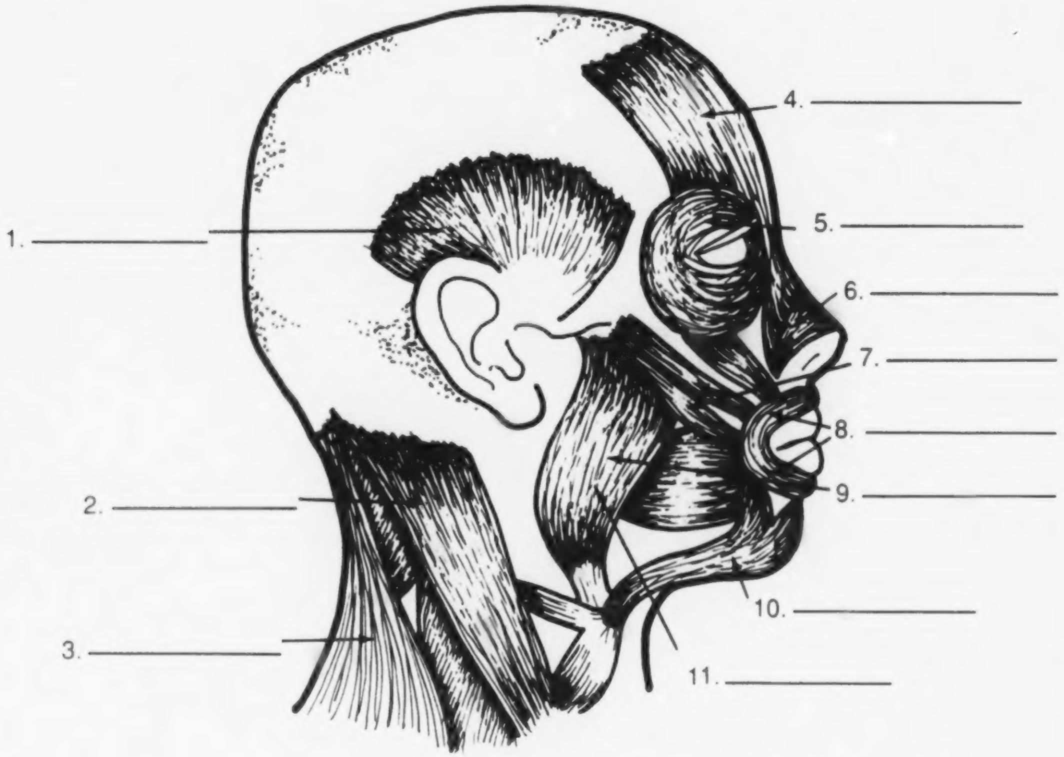
List criteria to use to help remember names of muscles. Provide an example of each.

1. ______
2. ______
3. ______
4. ______
5. ______

OBJECTIVE 8

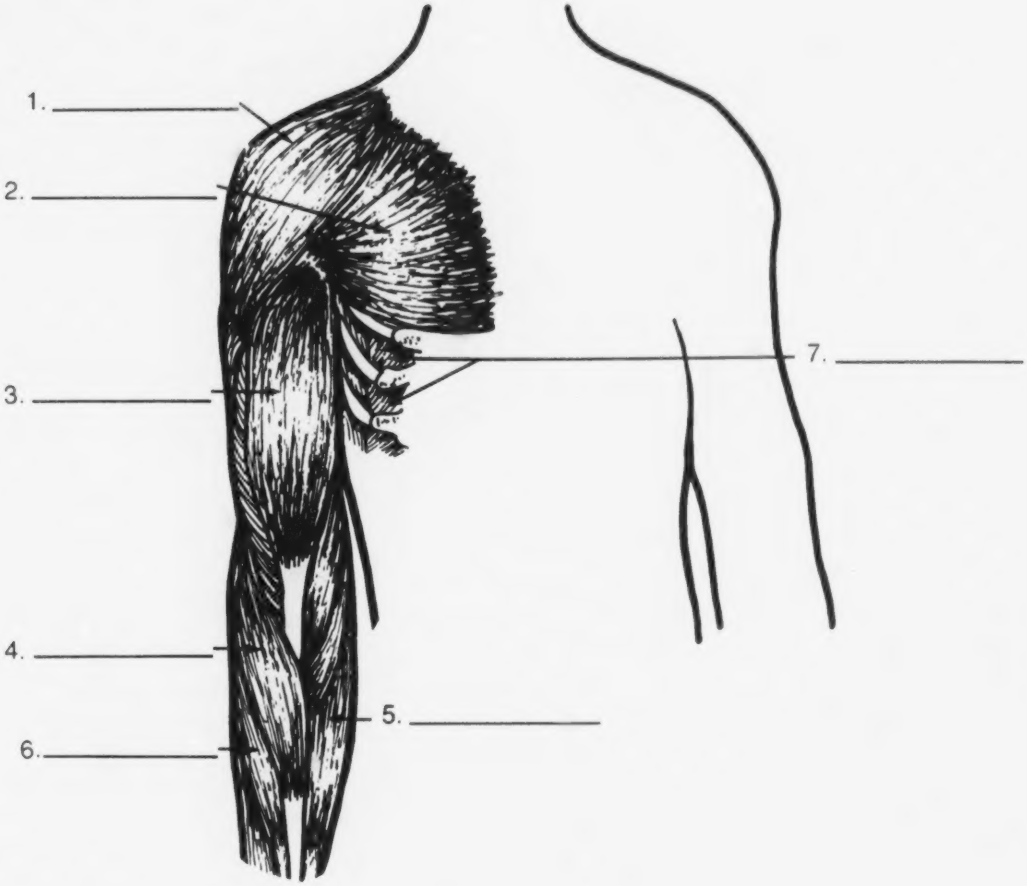
Identify principal skeletal muscles. Write the correct names in the blanks.

Head and neck



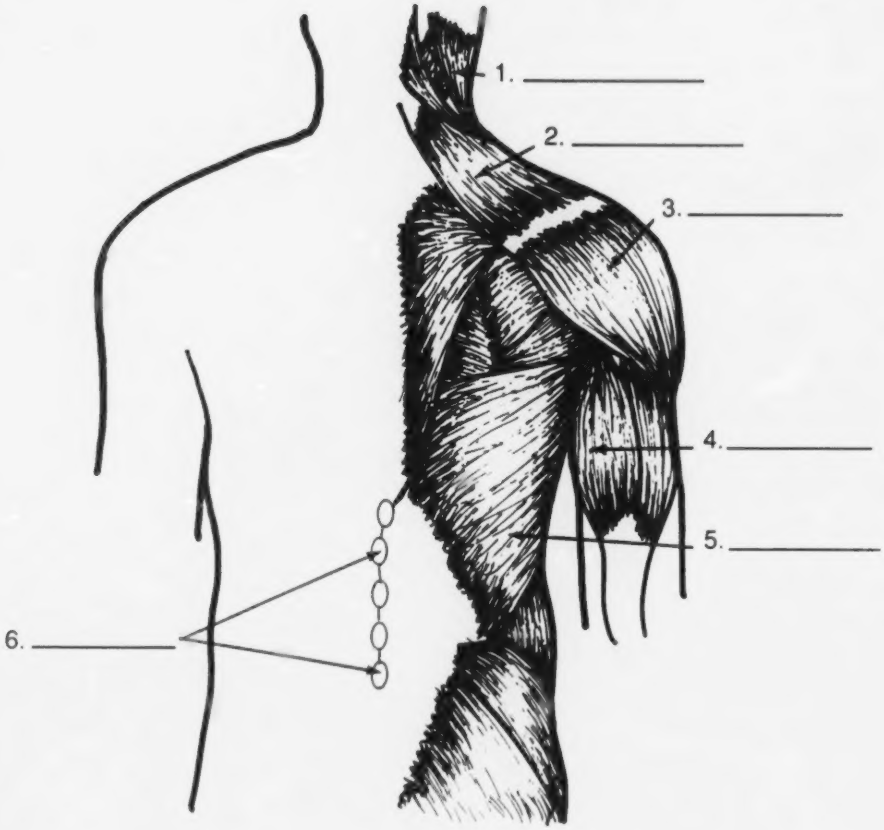
May be photocopied for student use.

Chest and arm



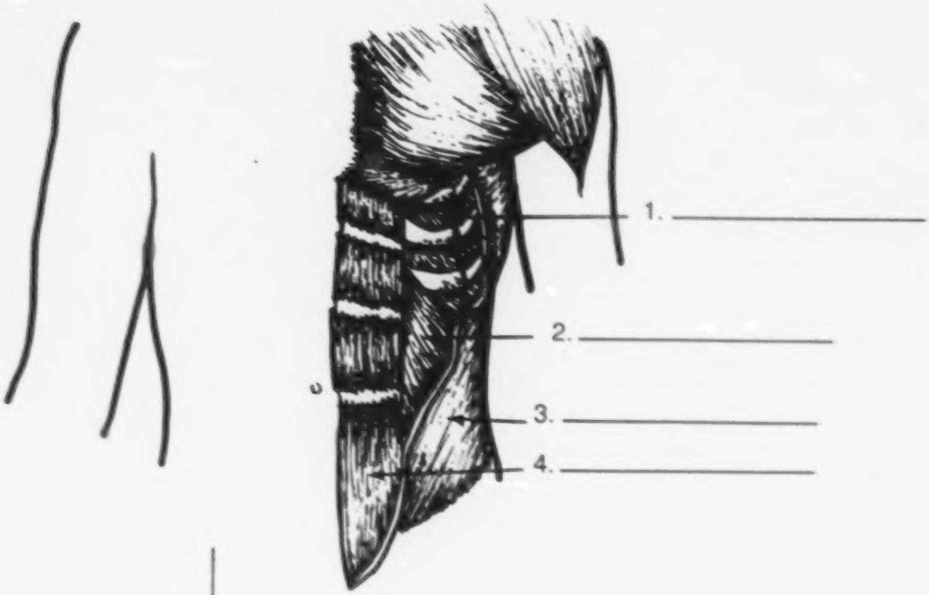
May be photocopied for student use.

Back



May be photocopied for student use.

Abdomen



May be photocopied for student use

Buttocks and posterior legs

1. ____________________

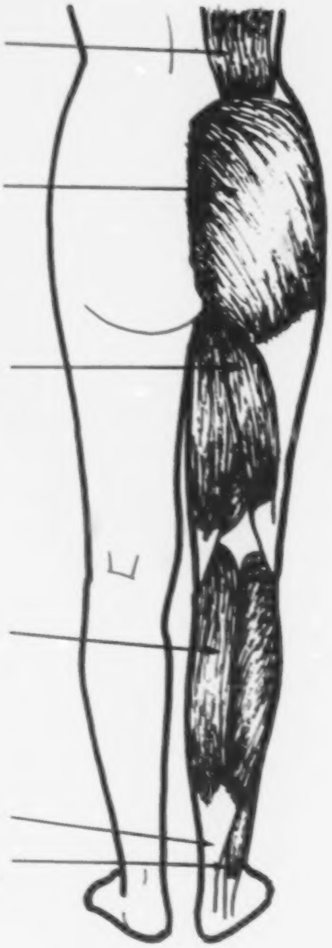
2. ____________________

3. ____________________

4. ____________________

5. ____________________

6. ____________________



May be photocopied for student use

Anterior legs

1. ____________________

2. ____________________

3. ____________________

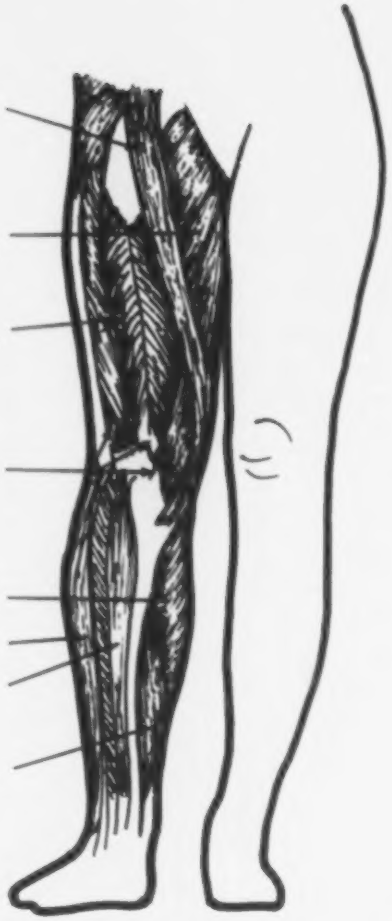
4. ____________________

5. ____________________

6. ____________________

7. ____________________

8. ____________________



358

May be photocopied for student use

OBJECTIVE 9 **Describe the muscle contraction process.** Write the steps in the process on the lines below.

May be photocopied for student use.

359

OBJECTIVE 10

Select from a list true statements about the muscle's role in body movement. Write an "X" in the blank before each true statement.

_____ 1. Muscles contract in direct proportion to the strength of the message to contract.

_____ 2. When the muscle cells contract, the muscle contracts and the insertion is moved toward the origin.

_____ 3. Muscle movement begins with contraction in each muscle cell, brought about by a chemical reaction.

_____ 4. An opposing muscle contracts to straighten the joint or bone.

_____ 5. When the muscle cells contract, the muscle contracts and the origin is moved toward the insertion.

_____ 6. Differences in speed or degree of movement are determined by the percentage of contraction in the affected cells.

_____ 7. Cells are controlled by the "All or None Law."

_____ 8. Muscle contraction ends to permit straightening the bone or joint.

_____ 9. Differences in speed or degree of movement are determined by the speed and number of cells contracting.

NOTE: Objective 11 is evaluated on the job sheet/assignment sheet in this unit. If you have not completed this component, see your instructor

THE MUSCULAR SYSTEM

OBJECTIVE 1

Part I		Part II	
1.	b	1.	g
2.	c	2.	b
3.	f	3.	f
4.	a	4.	h
5.	h	5.	e
6.	i	6.	d.

OBJECTIVE 2

1.	C	6.	SM	11.	SK
2.	SM	7.	SM	12.	SK
3.	SK	8.	SK		
4.	C	9.	C		
5.	SK	10.	SM		

OBJECTIVE 3

1. Origin
2. Body or belly
3. Insertion

OBJECTIVE 4

1. c
2. a
3. g
4. b
5. e

OBJECTIVE 5

1, 4, 5, 7

OBJECTIVE 6

1. Abduction
2. Adduction
3. Extension
4. Flexion
5. Inversion
6. Eversion
7. Elevation
8. Depression
9. Rotation
10. Pronation
11. Supination

OBJECTIVE 7

Students should list the following and give an example of each:

1. Action
2. Shape
3. Origin and insertion
4. Division number
5. Direction of fibers

OBJECTIVE 8

Head and neck

1. Temporalis
2. Sternocleidomastoid
3. Trapezius
4. Frontalis
5. Orbicularis oculi
6. Nasalis
7. Zygomaticus
8. Orbicularis oris
9. Buccinator
10. Digastricus
11. Masseter

Chest and arm

1. Deltoid
2. Pectoralis major
3. Biceps brachii
4. Brachioradialis
5. Flexor carpi
6. Extensor carpi
7. Intercostals

Back

1. Sternocleidomastoid
2. Trapezius
3. Deltoid
4. Triceps
5. Latissimus dorsi
6. Lumbodorsal fascia

Abdomen

1. Intercostals
2. Internal oblique
3. External oblique
4. Rectus abdominis

Buttocks and posterior leg

1. Gluteus medius
2. Gluteus maximus
3. Biceps femoris
4. Gastrocnemius
5. Achilles tendon

6. Soleus

Anterior leg

1. Sartorius
2. Adductor longus
3. Rectus femoris
4. Quadriceps femoris
5. Gastrocnemuis
6. Peroneus longus
7. Tibialis anterior
8. Soleus

OBJECTIVE 9

Discussion should ~~include the~~ following:

- Messages to the muscles are passed from nerve cells via ATP.
- The ATP creates a positive charge in the muscle's cell wall.
- The cell contracts.
- Calcium ions are released, causing the cell to shorten.
- When ATP production ceases, the muscles return to their normal size and shape.

OBJECTIVE 10

2, 3, 4, 7, 9

OBJECTIVE SHEET

THE DIGESTIVE SYSTEM

VII

INTRODUCTION

From ulcers to tooth decay, there are many health problems related to the digestive system. Modern diets, lifestyles, and pressures put great stress on this system. However, in recent years nutrition and digestive system concerns have received much public attention. Most people today try to be aware of how their digestive system can affect their overall health. As a health care professional, you should be well-informed about the digestive system and nutrition to help your clients and to help yourself.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify the organs, functions, and processes of the digestive system. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the digestive system to their definitions.
2. List the functions of the digestive system.
3. Match parts of the tooth and its adjacent structures to their descriptions.
4. Label the general structure of the tooth and its adjacent structures.
5. Match structures of the mouth to their descriptions.
6. Label the structures of the mouth.
7. Label the salivary glands.
8. Select from a list the functions of the salivary glands.
9. Label the major parts of the digestive system.
10. Select from a list true statements concerning the functions of the epiglottis and the esophagus.
11. Label the parts of the stomach.

12. Select the word or phrase that completes statements about the stomach.

13. Match gastric juices to their functions.

14. Label the portions of the small intestine.

15. Label segments of the large intestine.

16. Distinguish between the functions of the small intestine and the large intestine.

17. Label the accessory structures.

18. Select the word or phrase that completes statements about the functions of accessory structures.

19. Distinguish between mechanical and chemical digestion.

20. Complete a chart of the digestive process.

21. Arrange in order steps in the mechanism of rectal reflex.

22. Select from a list factors that affect basal metabolism rate (BMR).

23. Communicate about functions of the digestive system. (Assignment Sheet)

THE DIGESTIVE SYSTEM

PREPARATION

- Review the unit and plan your presentation.

- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Review teaching suggestions and plan classroom activities.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Order films, videotapes, and other media to supplement unit. Models of the digestive system are available from Opportunities for Learning, Inc., 941 Hickory Lane, Department XN, P.O. Box 8103, Mansfield, Ohio, 44901-8103, 1-419-589-1700.

- Contact guest speakers such as a gastroenterologist, internist, or dietician.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. Call the guest speaker a day or two before his/her scheduled appearance to confirm the appointment.

- Develop a bulletin board or display that illustrates the structure of the digestive system.

- Devise games and/or crossword puzzles to reinforce terms, grouping, etc.

  NOTE: Computer software which develops crossword puzzles is available to Oklahoma instructors from the Oklahoma Department of Vocational and Technical Education.

- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.

  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.

  - Arrange for photographs of all public speaking, presentations, or other public contact.

  - Host terminology and spelling contests.

  - Assist students in scheduling and presenting prepared and extemporaneous speeches.

  - Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.

  - Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.

  - Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

- Discuss unit objectives.

- Make transparencies.

- Utilize models, wall charts, or other visual aid materials to discuss the structures of the digestive system.

Objective 1: Match terms associated with the digestive system to their definitions.

- This unit will include a large number of terms. Review memory techniques.

- Discuss prefixes and suffixes associated with the digestive system.

- Review terms throughout the unit.

Objective 2: List the functions of the digestive system.

- Students will probably know the basic purpose of the digestive system. Discuss related digestive system functions and interrelated systems.

- Allow students to discuss digestive system problems they are familiar with.

- Have students collect newspaper and magazine articles related to the digestive system.

Objective 3: Match parts of the tooth and its adjacent structures to their descriptions.

Objective 4: Label the general structure of the tooth and its adjacent structures.

- Have students identify their own teeth and adjacent structures.

- Let students use dental mirrors, etc. to examine their own or another student's teeth.

- Invite a dentist or oral hygienist to discuss dental care and its relation to overall health.

Objective 5: Match structures of the mouth to their descriptions.

Objective 6: Label the structures of the mouth.

- Have students use mirrors to identify structures in their own mouths.

- Have students note differences in appearances among class members. Note things such as presence or absence of tonsils.

- Present photographs or slides of the effects of tobacco use on mouth structures and appearance.

Objective 7: Label the salivary glands.

Objective 8: Select from a list the functions of the salivary glands.

- Discuss the need for salivary glands.

Objective 9: Label the major parts of the digestive system.

- Have students identify each organ in the digestive system. If a three-dimensional model is available, have students reconstruct the system.

- Have students trace the alimentary canal, noting the name of each organ and its function.

Objective 10: Select from a list true statements concerning the functions of the epiglottis and esophagus.

- Have students compare the respiratory and digestive systems. Discuss the trachea and its importance.

Objective 11: Label the parts of the stomach.

Objective 12: Select the word or phrase that completes statements about the stomach.

- Discuss areas of the stomach. Discuss each area's features and purpose.

- Discuss functions of the stomach. Have students list as many functions as possible.

- Discuss the effect of poor diet on the stomach.

Objective 13: Match gastric juices to their functions.

- Illustrate the strength of gastric juices. Remind students that it eats meat, even bone.

- Discuss the components of gastric juices.

Objective 14: Label the portions of the small intestine.

Objective 15: Label segments of the large intestine.

- Discuss the intestines. Review their portions and uses.

- Discuss problems that can occur in the intestines and common treatments.

- Discuss "butterflies in our stomach" and other times stress affects our digestive system, especially our intestines.

Objective 16: Distinguish between the functions of the small intestine and the large intestine.

- Compare intestinal functions to those of other digestive system organs.

- Have students compare photographs of fecal materials and discuss what can be learned from them.

Objective 17: Label the accessory structures.

Objective 18: Select the word or phrase that completes statements about the functions of accessory structures.

- Give examples of common health problems related to the liver, gallbladder, and pancreas.

- Discuss the individual and coordinated functions of these organs.

- Discuss the importance of diet to these organs.

Objective 19: Distinguish between mechanical and chemical digestion.

Objective 20: Complete a chart of the digestive process.

- Students may have trouble understanding what an enzyme is. Be sure this is explained adequately.

- Compare enzymes to hormones. Ask students to distinguish between the two.

Objective 21: Arrange in order steps in the mechanism of rectal reflex.

- View television commercials about laxatives or diarrhea medications. How much real information is presented?

Objective 22: Select from a list factors that affect basal metabolism rate (BMR).

- Have students discuss diet and metabolism. Ask them to suggest "tricks" to raise metabolism and discuss the safety of doing so.

- Be sure students understand the relationship between metabolism and good health.

APPLICATION

Objective 23: Communicate about functions of the digestive system.

- Have students complete the Assignment Sheet to promote proper functioning of the digestive system.

- Use the Assignment Sheet to meet HOSA guidelines.

- Student Supplement 1 provides a list of suggestions for maintaining a healthy digestive system.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test the actions listed in the specific objectives.
- Give written test.
- Evaluate students on assignment sheet activities.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles if applicable.
- Review individual and group performances in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Diet: Health and Disease.* Human Relations Media, 175 Tompkins Avenue, Pleasantville, NY 10570-9973, 800-431-2050, Fax: 914-747-1744. Covers links between American disease rates and diets. Includes diabetes, heart disease, and cancer. Award winning. (Two-part filmstrip or filmstrip on tape)
- Muschetto, Paul, et al. *Introducing Biology.* Kendall/Hunt: Dubuque, IO, 1990.
- *Oklahoma Department of Vocational and Technical Education,* Resource Center 39, 1500 West Seventh Avenue, Stillwater, OK 74074-4364. The following films are available to Oklahoma teachers on a free-loan basis:

  Human Body Series: Digestive System (16 minutes, color, VHS)

  Human Body Series: Digestion and Absorption (16 minutes, color, VHS)
- *Opportunities for Learning, Inc.*, 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

  Anatomy and Physiology Filmstrips: The Digestive System–Unit 10. (Filmstrip with cassette and instructor's guide)

Human Systems Filmstrip Sets, Digestion in the Human Body. Covers food's path through the digestive system, mucous membrane lining, and accessory organs functions. (Filmstrip with cassettes and student self-instruction script booklet)

The Liver and Its Disorders, covers symptoms, possible treatments, surgery and follow-up. (10 minute, VHS)

The Stomach and Its Disorders, covers symptoms, possible treatments, surgery and follow-up. (10 minute, VHS)

Systems of the Body Filmstrip Set: Digestive and Excretory. Provides introductory information. (Four filmstrips with cassettes)

Print Media

- *Anatomical Charts from Peter Bachin and Ernest Beck.* Opportunities for Learning, Inc.: Mansfield, OH. Sets are available in a spiral notebook, framed, or with rods.

- Anthony, Catherine P. and Gary A. Thibodean. *Textbook of Anatomy and Physiology*, 11th ed. C.V. Mosby Co.: St. Louis, 1983.

- McClintic, J. Robert, *Basic Anatomy and Physiology of the Human Body*, John Wiley & Sons, New York, 1975.

- Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

  Health Charts. Opportunities for Learning, Inc.: Mansfield, OH. Set of 32 charts including "The Teeth and Their Care" and "Anatomy of Digestion."

  Human Body Transparencies: The Digestive System. Opportunities for Learning, Inc.: Mansfield, OH. Twelve transparencies, overlays, and lesson plans.

  Human Body Transparencies: Tooth Structure. Opportunities for Learning, Inc.: Mansfield, OH. Twelve transparencies, overlays, and lesson plans.

- *Schick Anatomy Charts.* Opportunities for Learning, Inc.: Mansfield, OH. Set of 30 charts with overlays, including "Digestive System," "Intestinal Villus and Digestive Disorders," "Human Body–Front," "Human Body–Back," "Tissues–Epithelial, Muscular, and Nervous," and "Tissues–Connective Tissues."

Software

- *Body Language: Human Anatomy and Physiology*. Projected Learning Programs, Inc., P. O. Box 3008, Paradise, CA 95967.
- *Crossword Magic*. L & S Computerware, Mindscape, Inc., 3444 Dundee Road, North Brook, IL.
- *The Human Body: An Overview*. Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P. O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700. Computer software including graphics, multiple choice, true-false, and short answer questions. Comes with teacher's guide. For use on Apple computers, 48K.

UNIT REFERENCES

- Hole, John W. Jr. *Human Anatomy and Physiology*, 4th ed., William C. Brown Co.: Dubuque, Iowa.
- Oppenheim, Michael. *The Complete Book of Better Digestion*. The Nurse's Book Society, Delran, NJ 08370.

THE DIGESTIVE SYSTEM

OBJECTIVE 1

Match terms associated with the digestive system to their definitions.

- **alimentary** – pertaining to or caused by food
- **alimentary canal** – organs that are part of the tube from the mouth to the rectum
- **antibodies** – proteins manufactured by the body to fight an antigen
- **basal metabolic rate** – rate at which metabolic reactions occur when the body is at rest
- **bile** – thick, yellow or greenish fluid produced by the liver; aids in the digestion and absorption of fats
- **bolus** – small lump or mass of chewed food
- **chyme** – semi-fluid mixture of partly digested food and digestive juices found in the stomach and small intestine
- **diaphragm** – the muscular membrane that separates the abdominal cavity from the thoracic cavity
- **digestion** – the mechanical and chemical breakdown of complex foodstuffs into simpler substances that are absorbed into the blood and lymph systems or eliminated from the body
- **enzyme** – complex protein capable of inducing a chemical change in another substance
- **feces** – food residue, bacteria, epithelium, and mucus discharged from the intestine
- **flatus** – gas in the digestive tract
- **gastroenterology** – the study of the digestive system
- **mastication** – chewing
- **mucus** – thick, sticky fluid produced by some membranes and glands
- **periodontal** – pertaining to area in and around the teeth

- **peristalsis** – rhythmic waves of contraction that move food along the digestive tract
- **sphincter** – a ringlike muscle that controls an outlet, permitting it to open and close
- **toxic** – any poisonous substance of microbic, vegetable, mineral, or animal origin
- **villi** – short, vascular, thread-like projections covering the mucous membrane of the small intestine

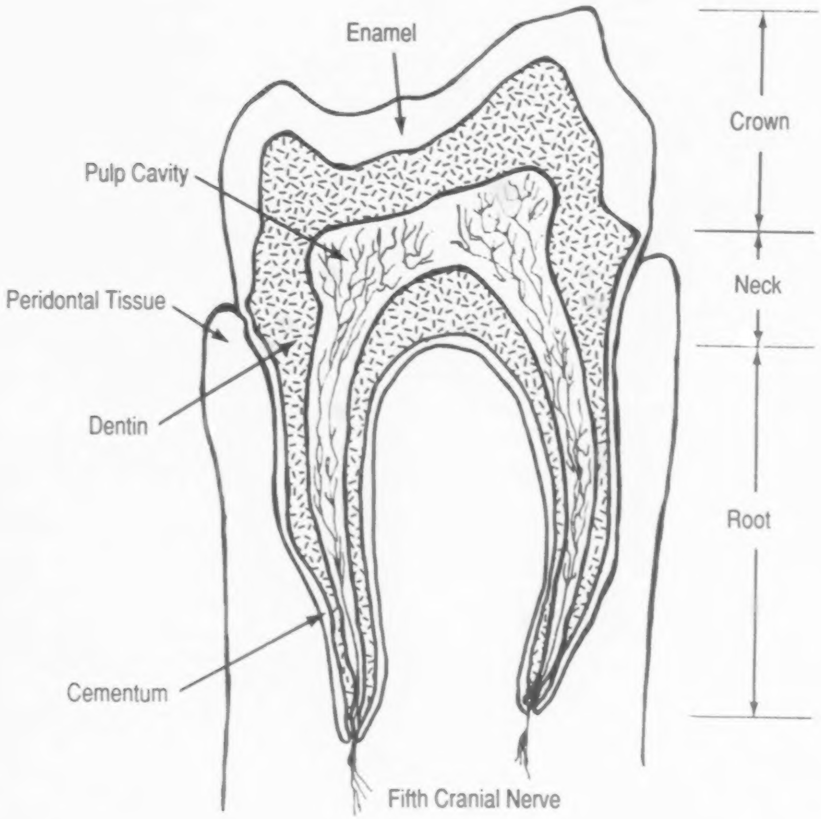
OBJECTIVE 2 **List the functions of the digestive system.**

- Breaks down food and prepares it for absorption and utilization
- Absorbs digested food materials
- Discharges waste products

OBJECTIVE 3 **Match parts of the tooth and its adjacent structures to their descriptions.**

- **cementum** – the bony tissue covering the root of a tooth
- **crown** – the portion of the tooth above the gum
- **dentin** – the calcified layer of a tooth between the enamel and pulp cavity
- **enamel** – the hard, calcium-based outer layer of a tooth
- **fifth cranial nerve** – the nerve spreading to the pulp cavities of the teeth
- **neck** – the portion of the tooth in which the tooth meets the gum
- **periodontal tissue** – the portion of the gum surrounding the teeth
- **pulp cavity** – the hollow, inner portion of a tooth containing blood vessels, nerves, and lymphatics
- **root** – the portion of the tooth beneath the surface of the gum

OBJECTIVE 4 **Label the general structure of the tooth and its adjacent structures.**

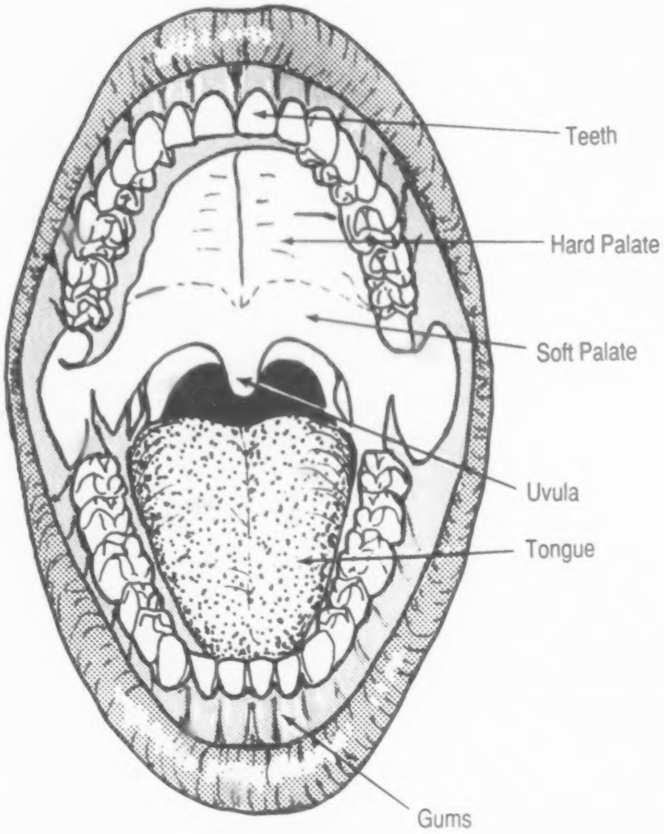

Enamel
Crown
Pulp Cavity
Neck
Peridontal Tissue
Dentin
Root
Cementum
Fifth Cranial Nerve

OBJECTIVE 5 **Match structures of the mouth to their descriptions.**

- **gums** – the tissue covering the jaws
- **hard palate** – the anterior portion of the roof of the mouth
- **soft palate** – the posterior portion of the roof of the mouth
- **teeth** – the bony projections from the jaws used for biting and chewing
- **tongue** – the large, skeletal muscle on the floor of the mouth
- **uvula** – tissue hanging from the soft palate

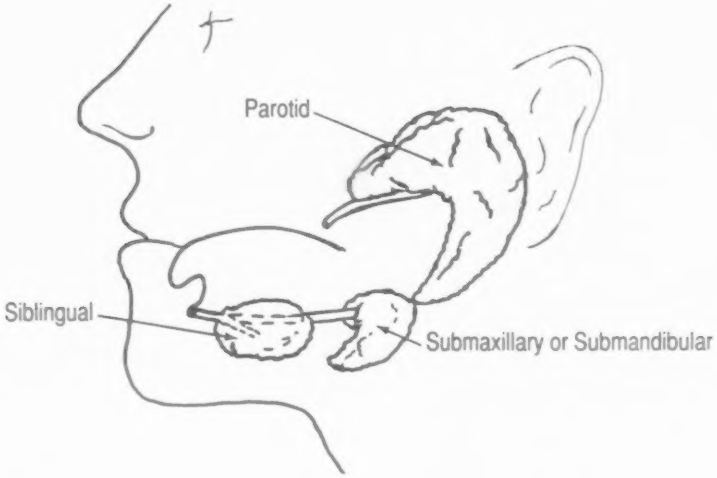
OBJECTIVE 6 **Label the structures of the mouth.**

NOTE: People have two sets of teeth: deciduous and permanent. The first set, the deciduous teeth, usually erupt between the ages of 6 months and 2 1/2 years. There are twenty deciduous teeth, ten in each jaw. The deciduous teeth are replaced by the permanent teeth. This second set consists of thirty two teeth, sixteen in each jaw.


Teeth
Hard Palate
Soft Palate
Uvula
Tongue
Gums

379

OBJECTIVE 7 | **Label the salivary glands.**

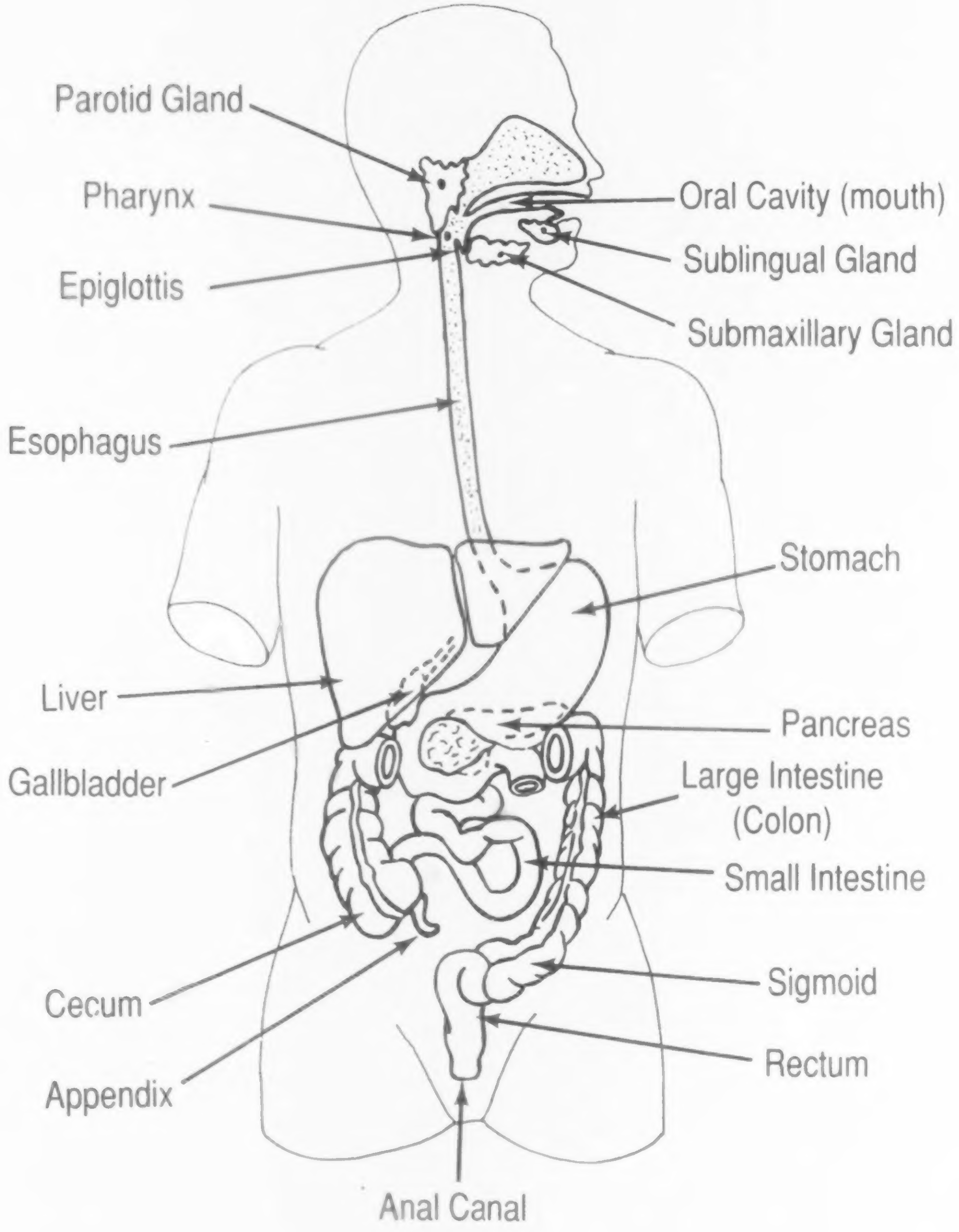

Parotid
Siblingual
Submaxillary or Submandibular

OBJECTIVE 8 | **Select from a list the functions of the salivary glands.**

The salivary glands produce saliva. The saliva:

- Moistens food
- Begins the conversion of starches to sugars
- Lubricates the food materials to promote swallowing

OBJECTIVE 9 | **Label the major parts of the digestive system.**



Parotid Gland
Pharynx
Epiglottis
Oral Cavity (mouth)
Sublingual Gland
Submaxillary Gland
Esophagus
Stomach
Liver
Pancreas
Gallbladder
Large Intestine (Colon)
Small Intestine
Cecum
Sigmoid
Rectum
Appendix
Anal Canal

OBJECTIVE 10 **Select from a list true statements concerning the functions of the epiglottis and the esophagus.**

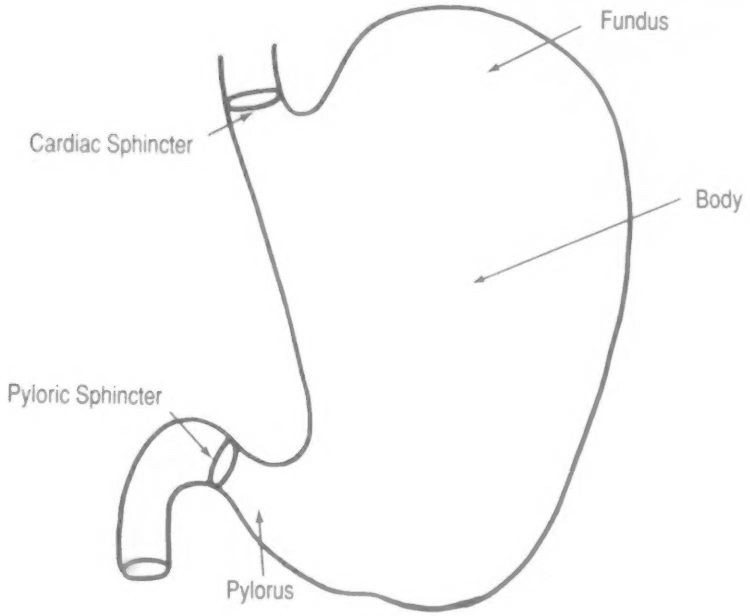
Epiglottis

- Prevents food from entering the trachea
- Routes food into the esophagus

Esophagus

- Serves as the tubular passageway for food from mouth to stomach
- Secretes mucus to aid in food movement
- Begins peristalsis

OBJECTIVE 11 **Label the parts of the stomach.**


Fundus
Cardiac Sphincter
Body
Pyloric Sphincter
Pylorus

381

OBJECTIVE 12

Select the word or phrase that completes statements about the stomach.

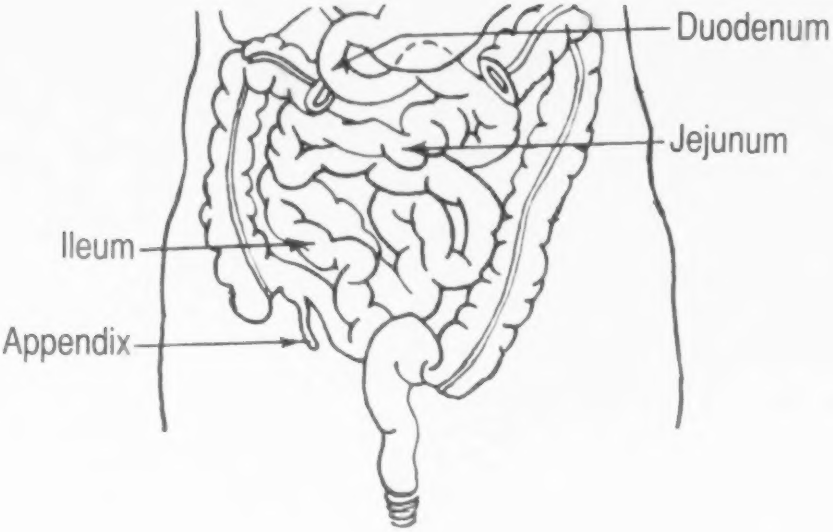
- Prepares food for digestion by changing it from a solid to a semi-fluid material (chyme) by a process called peristalsis
- Serves as a reservoir for food for the three or four hours needed for proper mixing
- Secretes approximately 2000 cc of gastric juice per day
- Begins digestion of proteins

OBJECTIVE 13

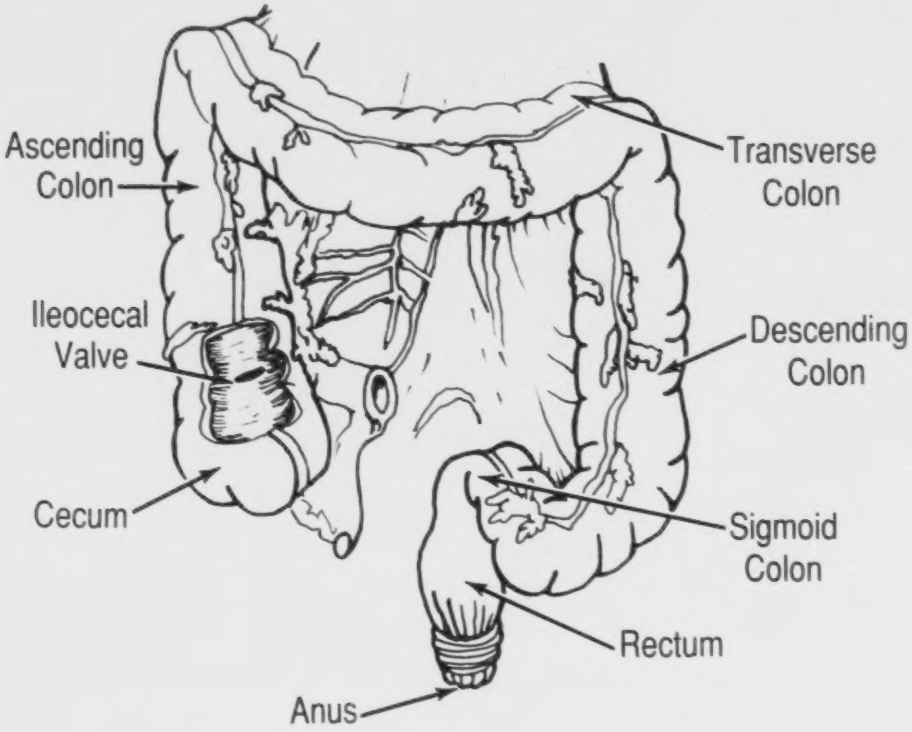
Match gastric juices to their functions.

- **enzymes** – begin the digestion of proteins
- **hydrochloric acid** – softens connective tissue in meats, kills bacteria, aids in iron absorption, and activates at least one stomach enzyme
- **intrinsic factor** – a substance essential to the body for the absorption of Vitamin B_{12}
- **mucin** – a mixture of proteins in mucus that helps protect the stomach lining
- **water** – functions as a solvent

OBJECTIVE 14 | **Label the portions of the small intestine.**


Duodenum
Jejunum
Ileum
Appendix

OBJECTIVE 15 | **Label segments of the large intestines.**


Ascending Colon
Transverse Colon
Ileocecal Valve
Descending Colon
Cecum
Sigmoid Colon
Rectum
Anus

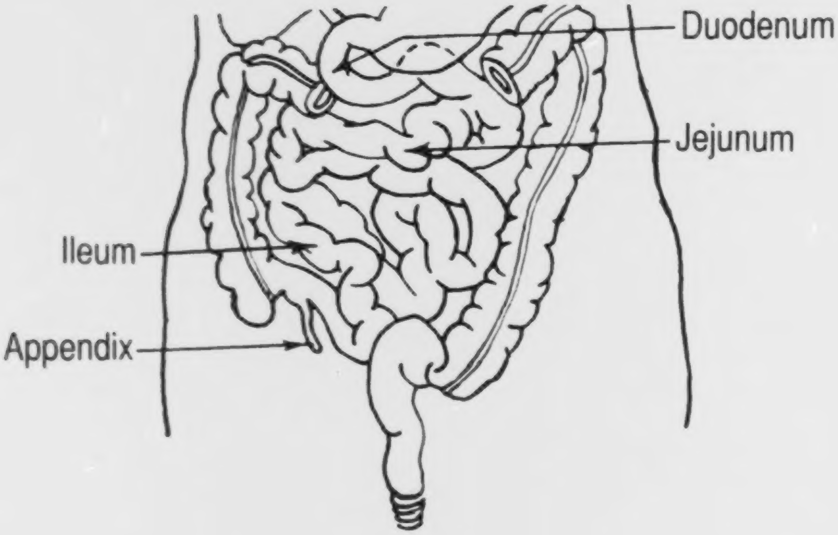
OBJECTIVE 16 | **Distinguish between the functions of the small intestine and the large intestine.**

Small intestine

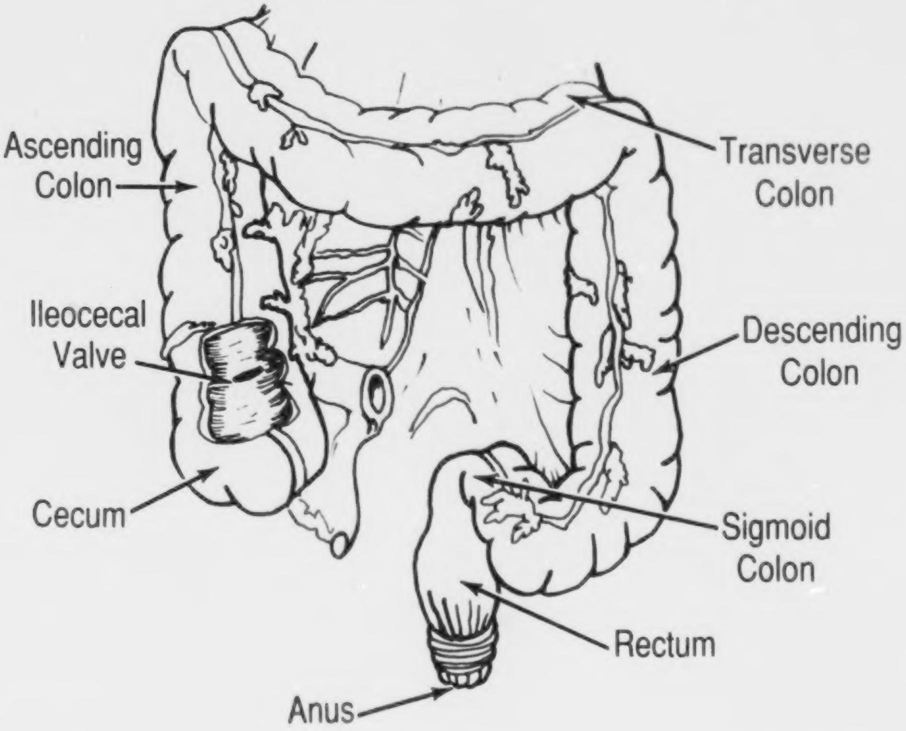
- Receives bile from the gall bladder and pancreatic juice from the pancreas
- Secretes intestinal juices
- Digests and absorbs the greater part of food

384

OBJECTIVE 14 | **Label the portions of the small intestine.**


Duodenum
Jejunum
Ileum
Appendix

OBJECTIVE 15 | **Label segments of the large intestines.**


Ascending Colon
Transverse Colon
Ileocecal Valve
Descending Colon
Cecum
Sigmoid Colon
Rectum
Anus

OBJECTIVE 16 | **Distinguish between the functions of the small intestine and the large intestine.**

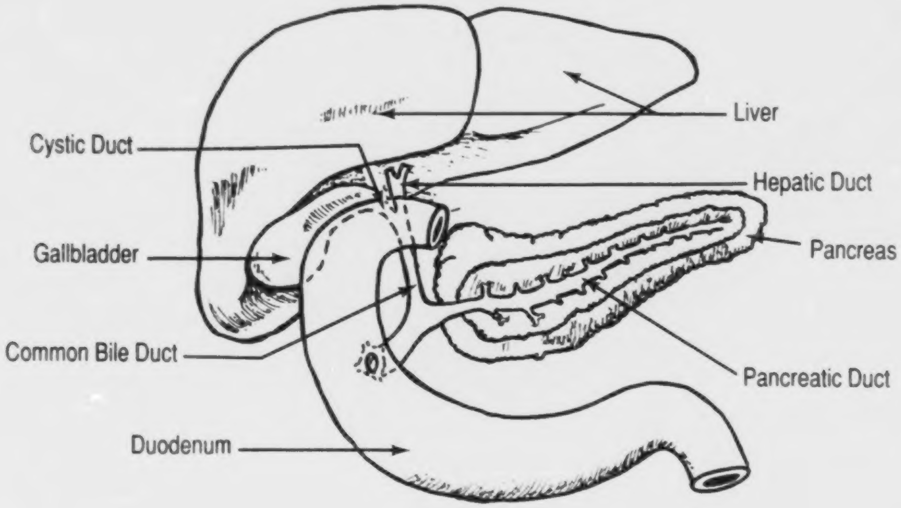
Small intestine

- Receives bile from the gall bladder and pancreatic juice from the pancreas
- Secretes intestinal juices
- Digests and absorbs the greater part of food

Large Intestine

- Reabsorbs water, mineral salts, and vitamins
- Provides a site for bacteria which produce Vitamin K and other bacteria that aid in absorption
- Secretes mucus to aid in the movement of feces

OBJECTIVE 17 **Label the accessary structures.**


Liver
Cystic Duct
Hepatic Duct
Pancreas
Gallbladder
Common Bile Duct
Pancreatic Duct
Duodenum

OBJECTIVE 18

Select the word or phrase that completes statements about the functions of accessory structures.

Liver

NOTE: The liver is also important to the immune, circulatory, and endocrine systems.

- Metabolizes fat, carbohydrate and protein
- Removes toxins, bacteria, worn out red blood cells, and waste (pigments) to the bile
- Manufactures cholesterol
- Forms antibodies
- Stores a variety of substances including glycogen, iron, simple sugars, and Vitamins A, D, K, and B_{12}
- Produces bile, cholesterol, and blood proteins

Gallbladder

- Stores bile until needed for digestion
- Releases bile to duodenum when needed

Pancreas

- Produces glucagon and insulin
- Produces pancreatic enzymes for digestion

Duodenum

- Receives bile from gall bladder and liver
- Receives enzymes from the pancreas and intestinal cells

  NOTE: The duodenum is part of the small intestine.

Common bile duct

- Carries bile from the liver and gall bladder to the duodenum

Pancreatic duct

- Carries enzymes from the pancreas to the duodenum

388

Cystic duct

- Carries bile when food is not being digested and bile backs up into the cystic duct from the duodenum to the gall bladder for storage

Hepatic duct

- Connects the liver to the common bile duct, which is connected to the duodenum

OBJECTIVE 19

Distinguish between mechanical and chemical digestion.

Mechanical digestion

- Food is broken down into smaller particles.
- Digestive juices and food are moistened and mixed.
- Food is moved along the digestive tract.
- It begins in the mouth with chewing and continues along the alimentary tract with swallowing in the esophagus, churning action in the stomach, and peristalsis in the small intestine.
- Muscles in the tongue, jaw, pharynx, esophagus, stomach, and intestines furnish the needed power.
- Nutrients are absorbed through the villi in the small intestine into the blood and lymph systems.

Chemical digestion

- Digestive juices and enzymes cause chemical changes in the food.
- Carbohydrates are changed to simple sugars in the mouth and small intestine.
- Fats are turned into fatty acids in the small intestine.
- Proteins are changed into amino acids in the stomach and small intestine.

OBJECTIVE 20 **Complete a chart of the digestive process.**

Site	Secretion	Enzyme	Works on	Final Product
Mouth	Saliva	Salivary amylase (ptyalin)	Starch	Simple Starches (maltose)
Stomach	Gastric juice	Pepsin	Protein	Polypeptides
Intestines and pancreas	Pancreatic juice and bile	Trypsin	Polypeptides	Amino acids
		Pancreatic amylase	Carbohydrates	Glucose, maltose
		Bile	Fats	Fatty acids and glycerols
		Lactase, maltase, and sucrase	Lactose, maltose, and sucrose	Simple sugars (glucose, fructose, galactose)

OBJECTIVE 21 **Arrange in order steps in the mechanism of rectal reflex.**

1. The sigmoid and rectum become distended with fecal material.
2. Impulses are transmitted to the spinal cord.
3. The muscle walls of the rectum are excited.
4. The walls of the rectum contract and the internal sphincter relaxes.

OBJECTIVE 22 **Select from a list factors that affect basal metabolism rate (BMR).**

- **Internal secretions**

  NOTE: Secretions of the thyroid and adrenal glands affect basal metabolism rate. Usually hyperthyroidism causes an increase and hypothyroidism causes a decrease in rate. An emotional state that stimulates secretions of the endocrine glands could increase the rate of body processes and give an incorrect reading in the BMR test.

- **Age**

  NOTE: Children have a higher BMR than adults. In older persons there is a marked decrease.

- **Body shape and size**

  NOTE: A tall, thin person has a higher BMR than a short, fat person.

- **Sex**

  NOTE: Women usually have a lower BMR than men.

- **Emotional stress**

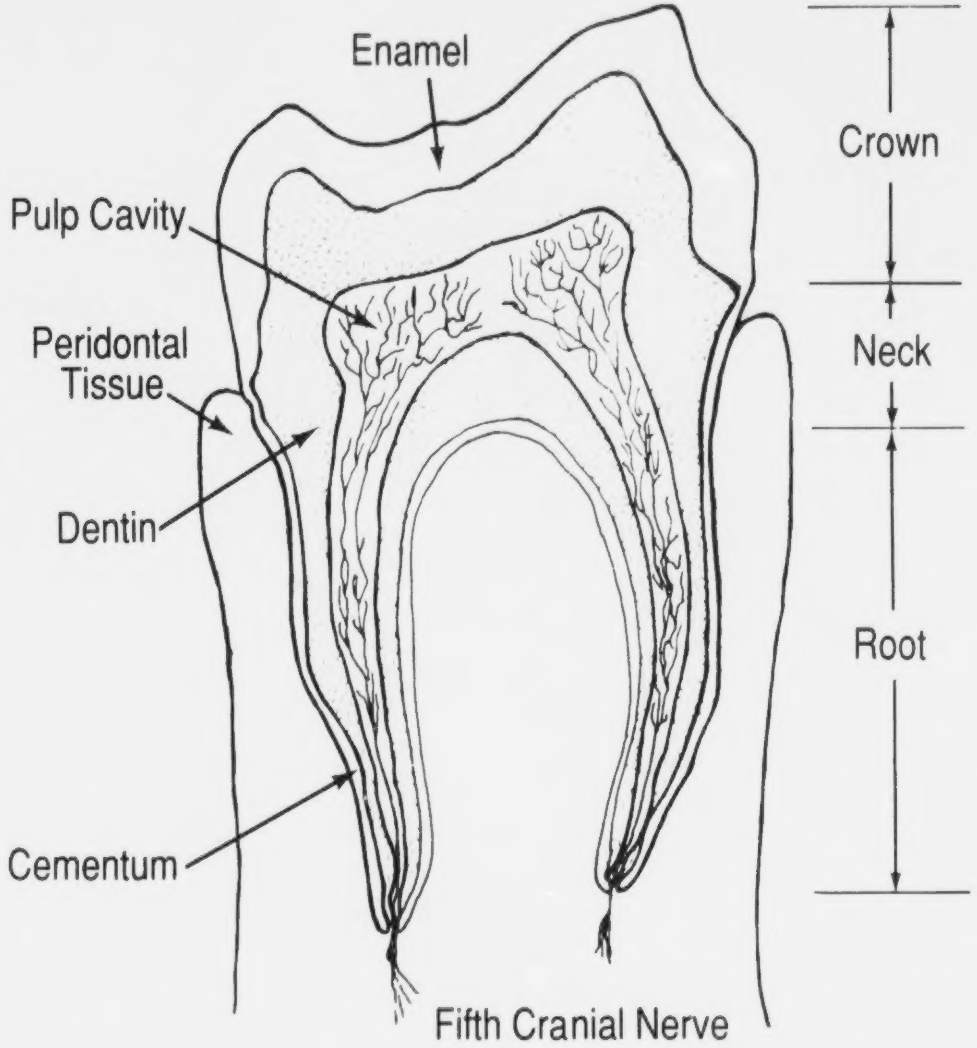
- **Climate**

  NOTE: People in colder climates have a higher BMR than people in warmer climates.

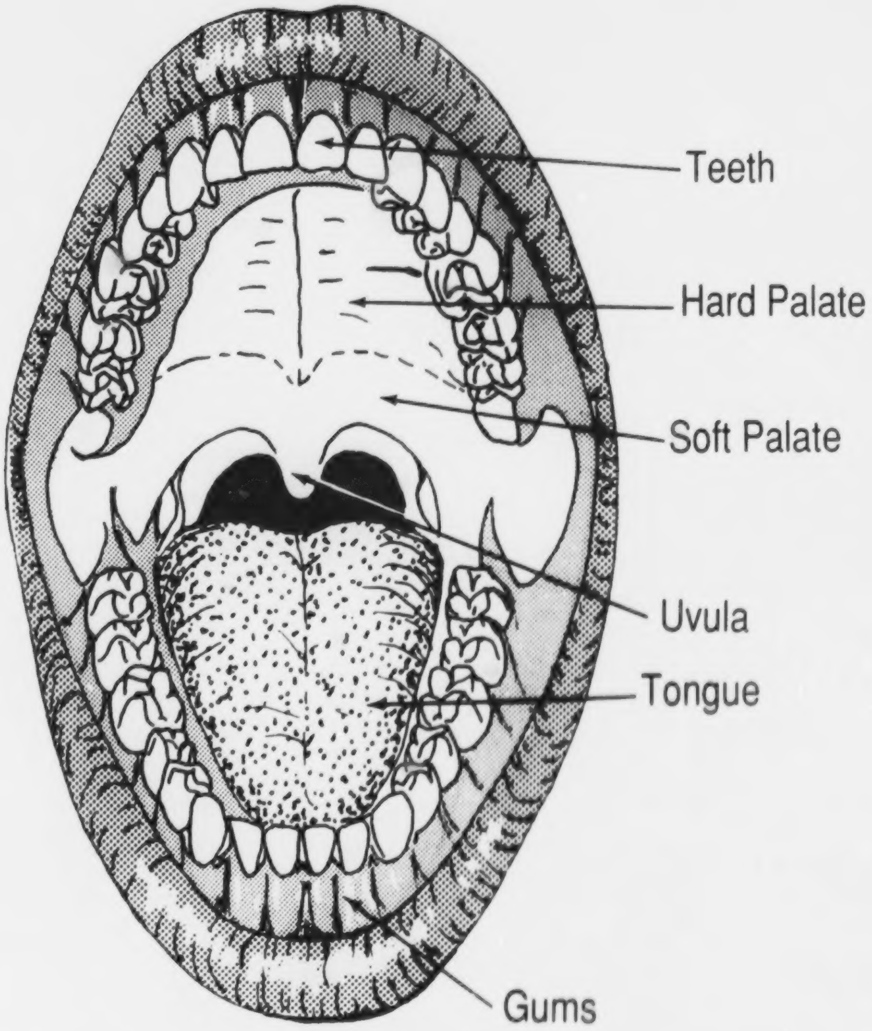
MAINTAIN A HEALTHY DIGESTIVE SYSTEM

- Don't smoke
- Avoid heavy lifting
- Avoid straining at the stool
- Avoid prolonged use of laxatives
- Eat a balanced diet
- Eat a diet high in fiber
- Limit your intake of fats, sweets, spicy foods, alcohol, and caffeine
- Drink plenty of fluids
- Observe regular mealtimes
- Empty bowels regularly
- Brush and floss teeth after meals
- Exercise regularly
- Learn to manage stress
- Visit your physician for an annual physical after age 25

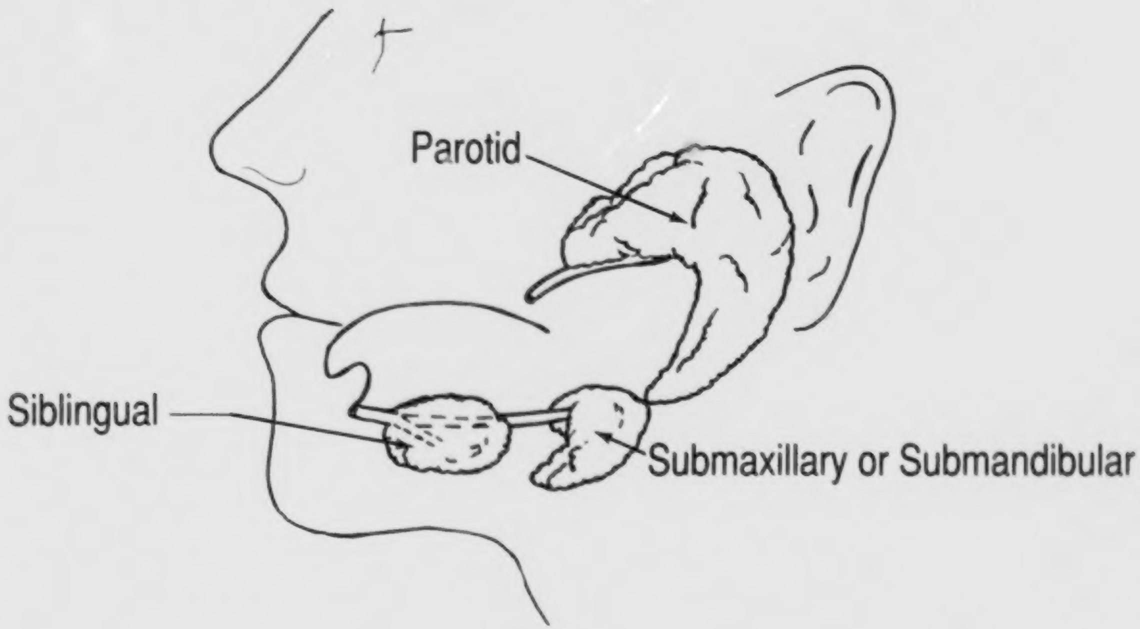
Structure of the Tooth


Enamel
Crown
Pulp Cavity
Peridontal Tissue
Neck
Dentin
Root
Cementum
Fifth Cranial Nerve

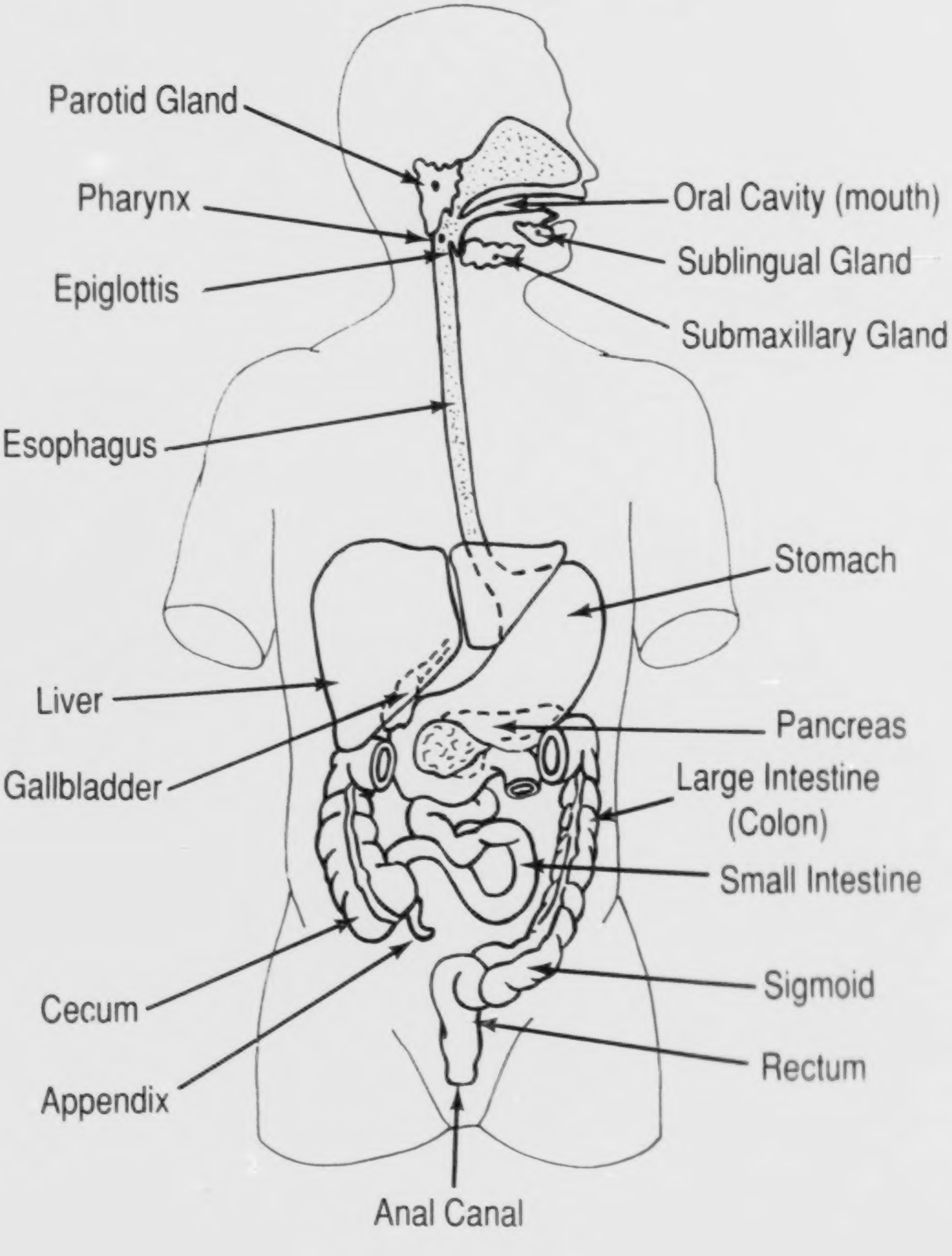
Structure of the Mouth


Teeth
Hard Palate
Soft Palate
Uvula
Tongue
Gums

Salivary Glands

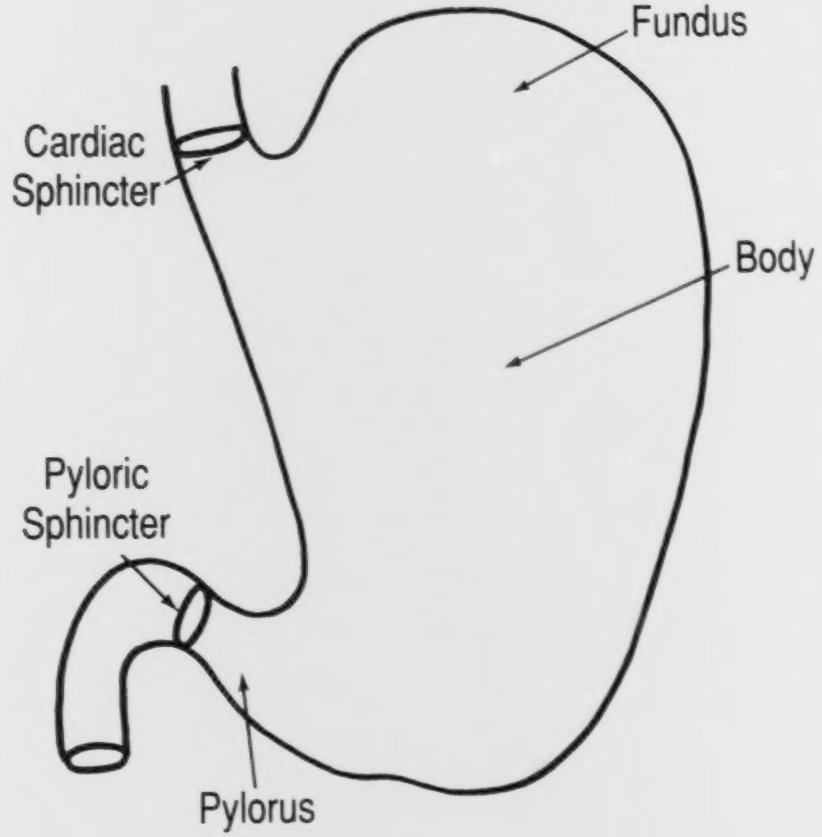

Parotid
Siblingual
Submaxillary or Submandibular

The Digestive Organs .

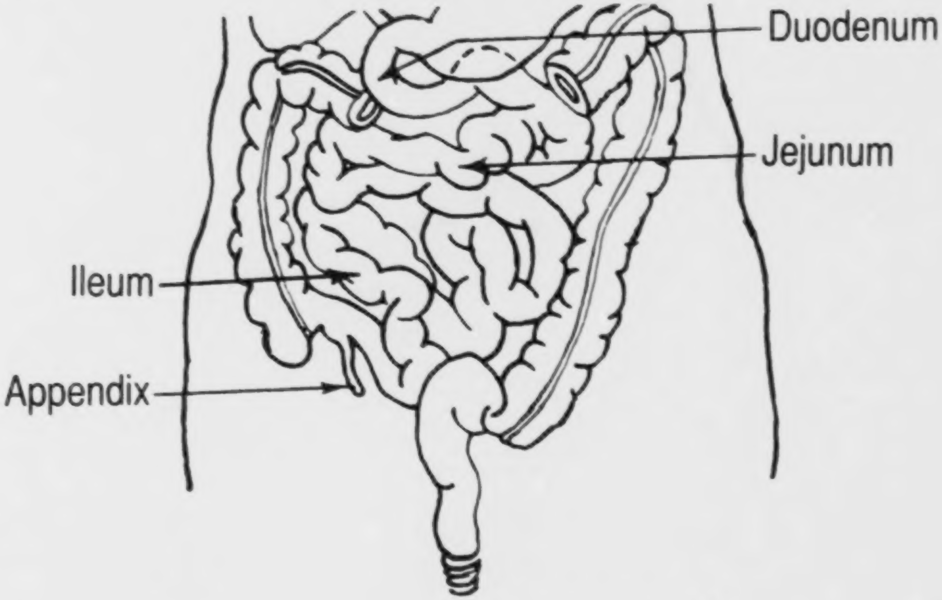

Parotid Gland
Pharynx
Epiglottis
Esophagus
Liver
Gallbladder
Cecum
Appendix
Anal Canal
Oral Cavity (mouth)
Sublingual Gland
Submaxillary Gland
Stomach
Pancreas
Large Intestine (Colon)
Small Intestine
Sigmoid
Rectum

397

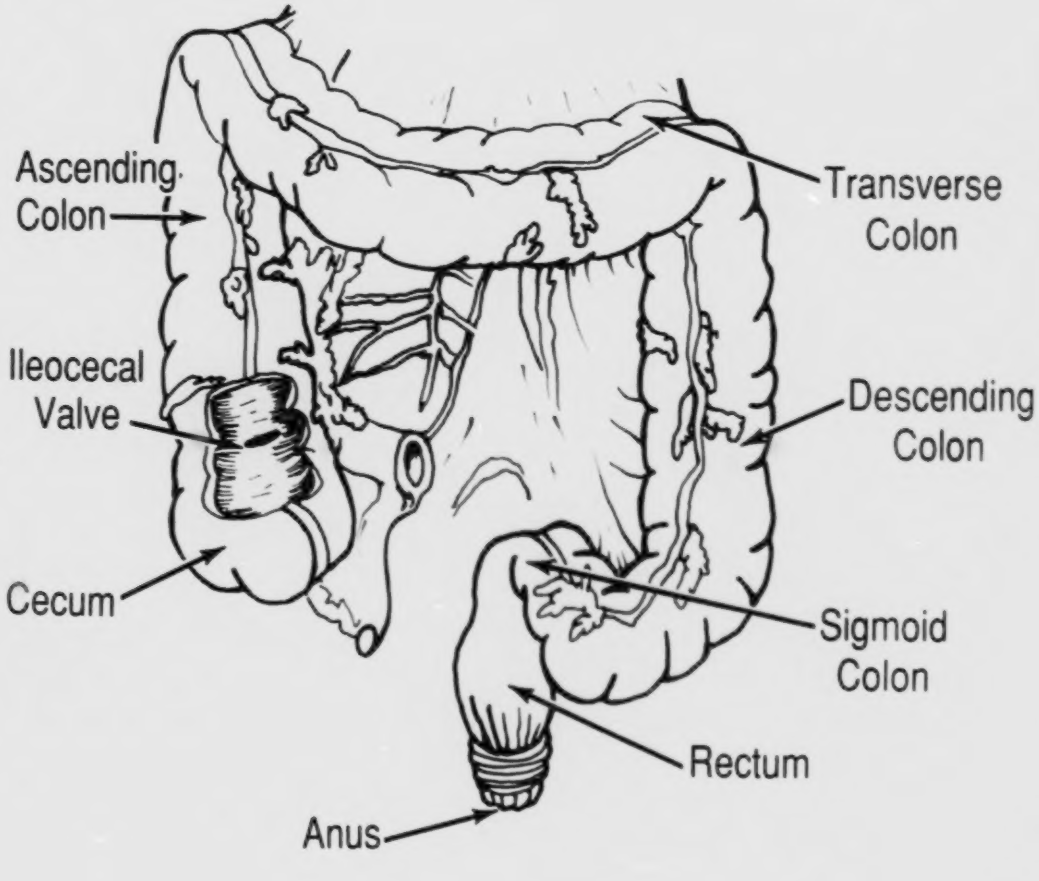
The Stomach


Fundus
Cardiac Sphincter
Body
Pyloric Sphincter
Pylorus

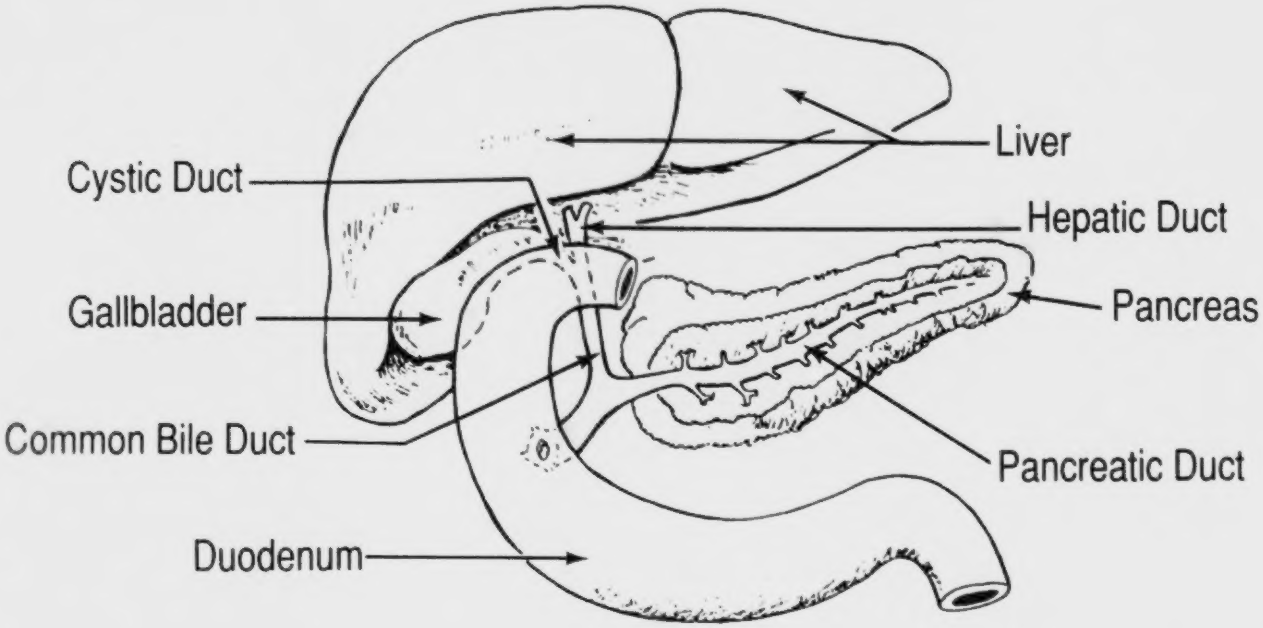
The Small Intestine


Duodenum
Jejunum
Ileum
Appendix

The Large Intestine


Ascending Colon
Transverse Colon
Ileocecal Valve
Descending Colon
Cecum
Sigmoid Colon
Rectum
Anus

The Accessary Structures


Liver
Cystic Duct
Hepatic Duct
Gallbladder
Pancreas
Common Bile Duct
Pancreatic Duct
Duodenum

TRANSPARENCY MASTER 8 Body Structure and Function
CIMC VII 43

TM 8

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization

  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language

  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing effective leadership

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:

  - Remind the students that sometimes body language says as much as, or mor than, the words you use. Have them discuss or demonstrate what they know about body language.

  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."

  - Discuss how body language is used in skits and mime to convey the appropriate meaning.

- If students have difficulty adapting their presentation to a specific audience:

  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.

  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.

- If students have difficulty creating a finished product:

  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.

  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

- If students have difficulty developing effective leadership:

  - Have the class discuss traits that make a person an effective leader.

  - Remind the students that an effective leader does not boss people needlessly or order other people to do his or her work–an effective leader is a person who can get a task finished by combining his or her talents with the talents of the other people to best complete a project. It is a person who can both suggest ideas and listen openly to the ideas of others. It is a person who can make an educated decision when necessary to the success of the project.

- Provide students with opportunities to develop leadership skills by dividing the class into groups to plan and complete the assignment sheet activity or any other appropriate activity.
- Work with the groups to ensure that each student has the opportunity and the information needed to lead one phase of the assignment.

ASSIGNMENT SHEET

THE DIGESTIVE SYSTEM

VII

Name ______________________ Score __________

OBJECTIVE 23

Communicate about functions of the digestive system.

INTRODUCTION

The digestive system and the importance of proper nutrition have received a lot of attention in recent years. Mixed in with the good information is a lot of bad information. As a health care professional, you will be expected to know correct and useful information about promoting the proper function of the digestive system and good nutrition.

DIRECTIONS

- Prepare a poster, brochure, or demonstration about the digestive system. You may discuss any phase you choose. Be sure your information is correct and up to date. Present your information to the class.
- Prepare a skit about a bite of a chicken sandwich with mayonnaise going through the digestive system.

Language Skills
- Use grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (written and oral)

Job Acquisition/ Development Skills
- Develop effective leadership

ASSIGNMENT SHEET

The information should be correct and up to date. It should be useful and presented in a format that makes it easy to understand and apply to everyday life. The student should be able to answer questions about the subject matter.

WRITTEN TEST

THE DIGESTIVE SYSTEM

VII

Name ______________________________ Score __________

OBJECTIVE 1

Match terms associated with the digestive system to their definitions. Write the correct letter in the blank.

Part I

_____ 1. Pertaining to or caused by food

_____ 2. Complex protein capable of inducing a chemical change in another substance

_____ 3. Rate at which metabolic reactions occur when the body is at rest

_____ 4. Short, vascular, thread-like projections covering the mucous membrane of the small intestine

_____ 5. Chewing

_____ 6. Pertaining to area in and around the teeth

_____ 7. Gas in the digestive tract

_____ 8. A ringlike muscle that controls an outlet, permitting it to open and close

_____ 9. The muscular membrane that separates the abdominal cavity from the thoracic cavity

_____ 10. Small lump or mass of chewed food

a. alimentary
b. antibodies
c. basal metabolic rate
d. bolus
e. chyme
f. diaphragm
g. digestion
h. enzyme
i. flatus
j. mastication
k. periodontal
l. peristalsis
m. sphincter
n. toxic
o. villi

May be photocopied for student use.

Part II

_____ 1. Any poisonous substance of microbic, vegetable, mineral, or animal origin

_____ 2. Food residue, bacteria, epithelium, and mucus discharged from the intestine

_____ 3. The mechanical and chemical breakdown of complex foodstuffs into simpler substances that are absorbed into the blood and lymph systems or eliminated from the body

_____ 4. Semi-fluid mixture of partly digested food and digested juices found in the stomach and small intestine

_____ 5. Organs that are part of the tube from the mouth to the rectum

_____ 6. Proteins manufactured by the body to fight an antigen

_____ 7. Rhythmic waves of contraction that move food along the digestive tract

_____ 8. The study of the digestive system

_____ 9. Thick, sticky fluid produced by some membranes and glands

_____ 10. Thick, yellow or greenish fluid produced by the liver; aids in the digestion and absorption of fats

a. alimentary canal

b. antibodies

c. bile

d. bolus

e. chyme

f. diaphragm

g. digestion

h. feces

i. gastroenterology

j. mastication

k. mucus

l. periodontal

m. peristalsis

n. toxic

o. villi

May be photocopied for student use

OBJECTIVE 2

List the functions of the digestive system. Write the three digestive system functions.

1. ____

____

2. ____

____

3. ____

____

OBJECTIVE 3

Match parts of the tooth and its adjacent structures to their descriptions. Write the correct letter in the blank.

_____ 1. The calcified layer of a tooth between the enamel and pulp cavity

_____ 2. The hollow, inner portion of a tooth containing blood vessels, nerves, and lymphatics

_____ 3. The bony tissue covering the root of a tooth

_____ 4. The portion of the tooth in which the tooth meets the gum

_____ 5. The nerve spreading to the pulp cavities of the teeth

_____ 6. The portion of the tooth beneath the surface of the gum

_____ 7. The hard, calcium-based outer layer of a tooth

_____ 8. The portion of the gum surrounding the teeth

_____ 9. The portion of the tooth above the gum

a. cementum

b. crown

c. dentin

d. enamel

e. fifth cranial nerve

f. fifth periodontal nerve

g. gum

h. neck

i. periodontal tissue

j. pulp cavity

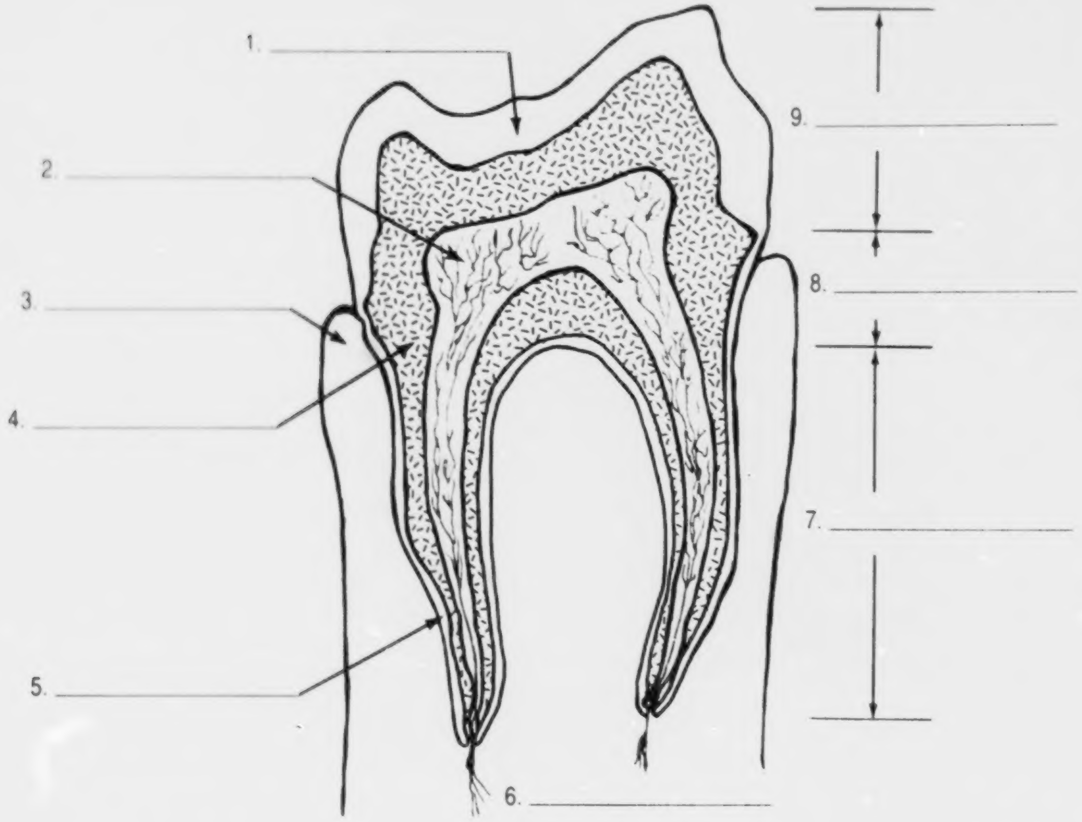
k. root

l. root canal

m. shaft

May be photocopied for student use.

OBJECTIVE 4 | **Label the general structure of the tooth and adjacent structures.** Write the names in the blanks.



413

May be photocopied for student use.

OBJECTIVE 5

Match structures of the mouth to their descriptions.

_____ 1. The anterior portion of the roof of the mouth

_____ 2. The large, skeletal muscle on the floor of the mouth

_____ 3. The posterior portion of the roof of the mouth

_____ 4. Tissue hanging from the soft palate

_____ 5. The tissue covering the jaws

_____ 6. The bony projections from the jaws used for biting and chewing

a. adenoids

b. gums

c. hard palate

d. periodontal tissue

e. soft palate

f. teeth

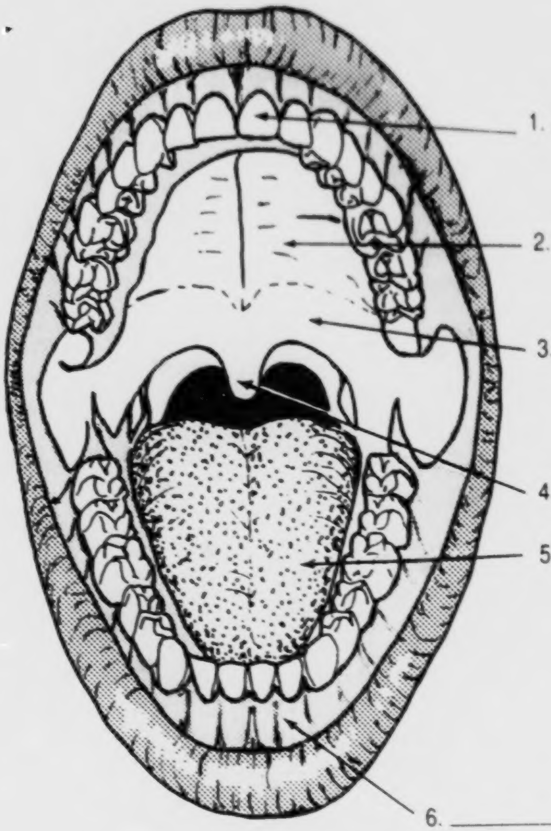
g. tongue

h. upper plate

i. uvula

May be photocopied for student use.

OBJECTIVE 6 | **Label the structures of the mouth.** Write the names in the blanks.



1. ______________________

2. ______________________

3. ______________________

4. ______________________

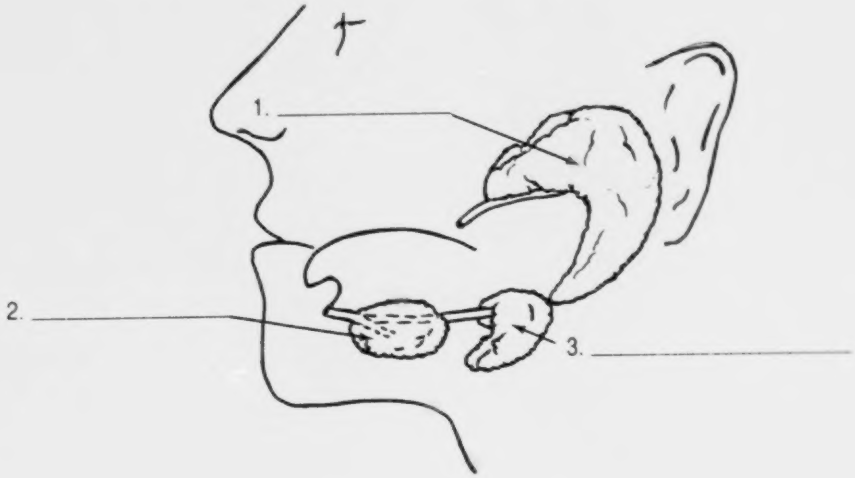
5. ______________________

6. ______________________

415

May be photocopied for student use.

OBJECTIVE 7 **Label the salivary glands.** Write the names in the blanks.



OBJECTIVE 8 **Select from a list the functions of the salivary glands.** Write an "X" in the blank before each function of the salivary glands.

_____ 1. Provides moisture necessary to maintain the palate

_____ 2. Begins the conversion of starches to sugars

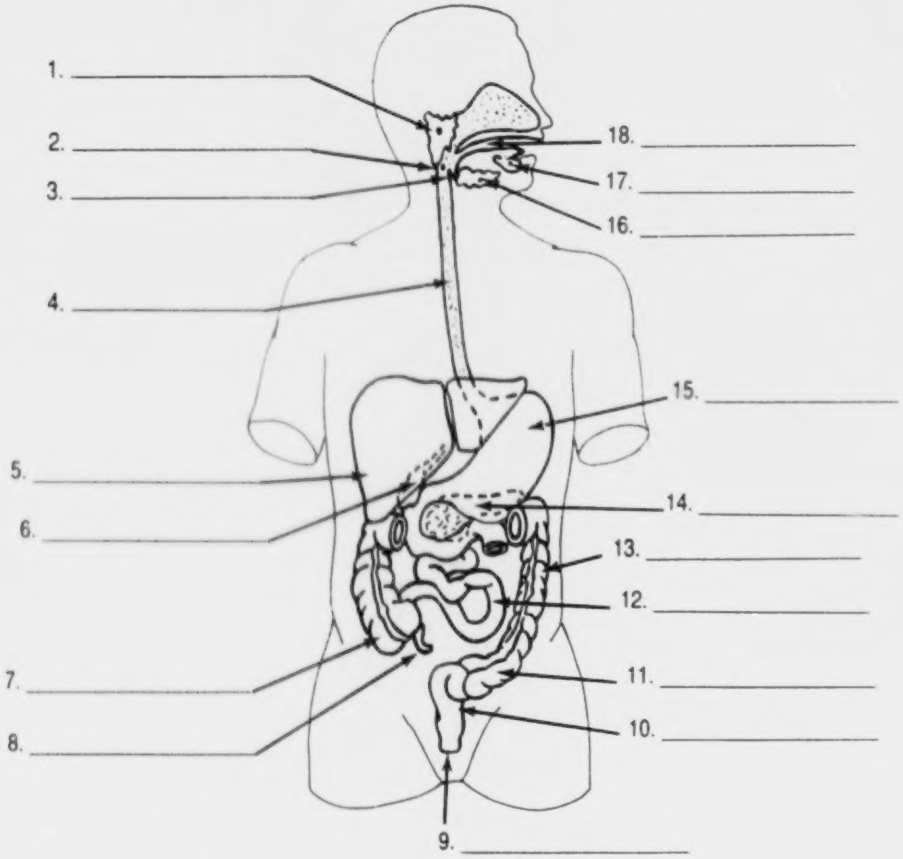
_____ 3. Lubricates the food materials to promote swallowing

_____ 4. Activates taste buds

_____ 5. Moistens food

May be photocopied for student use.

OBJECTIVE 9 | **Label the major parts organs of the digestive system.** Write the names in the blanks.


1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____
11. ____
12. ____
13. ____
14. ____
15. ____
16. ____
17. ____
18. ____

May be photocopied for student use.

OBJECTIVE 10

Select from a list true statements concerning the functions of the epiglottis and the esophagus. Write an "X" in the blanks before true statements about functions of the esophagus and epiglottis.

_____ 1. Peristalsis begins in the esophagus.

_____ 2. Mastication begins in the esophagus.

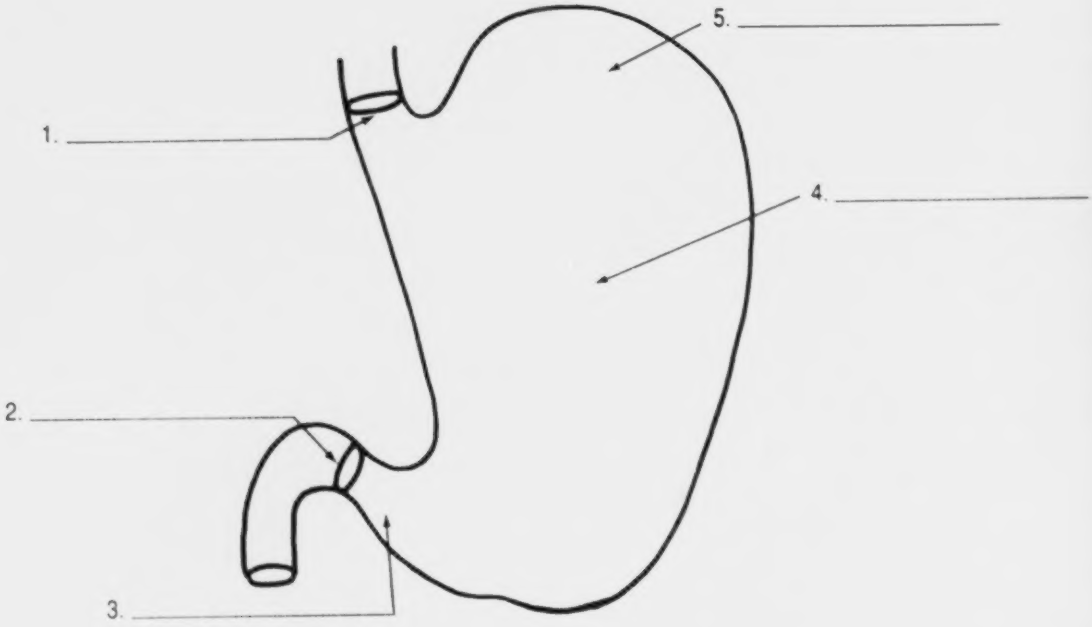
_____ 3. Bile is transported through the esophagus.

_____ 4. The epiglottis prevents food from entering the trachea.

_____ 5. The esophagus secretes mucus to aid in food movement.

OBJECTIVE 11

Label the parts of the stomach. Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 12

Select the word or phrase that completes statements about the stomach. Write the correct letter in the blank.

_____ 1. The stomach changes food from a solid to a

- a. gel
- b. semi-fluid material
- c. fluid
- d. acidic mixture

_____ 2. The stomach begins the digestion of

- a. proteins
- b. fats
- c. carbohydrates
- d. minerals

_____ 3. The stomach serves as a reservoir for food for

- a. three or four hours
- b. four to six hours
- c. ten to twelve hours
- d. approximately twenty-four hours

OBJECTIVE 13

Match gastric juices to their functions. Write the correct letter in the blank.

_____ 1. Begin the digestion of proteins

_____ 2. A substance essential to the body for the absorption of Vitamin B_{12}

_____ 3. Softens connective tissue in meats, kills bacteria, aids in iron absorption, and activates at least one stomach enzyme

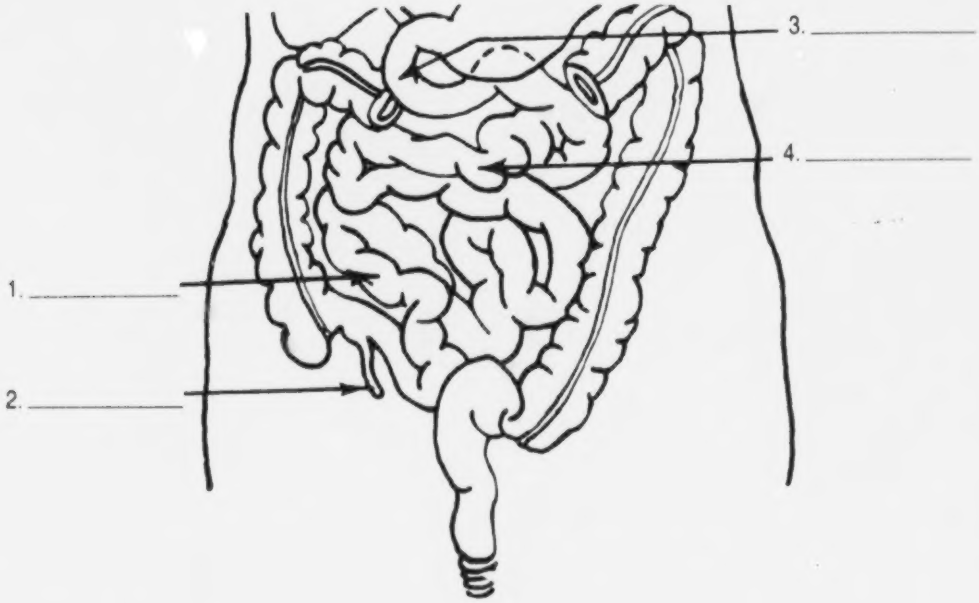
_____ 4. Functions as a solvent

_____ 5. A mixture of proteins in mucus that helps protect the stomach lining

- a. enzymes
- b. hydrochloric acid
- c. intrinsic factor
- d. mucin
- e. vitamin K
- f. water
- g. yeast

May be photocopied for student use.

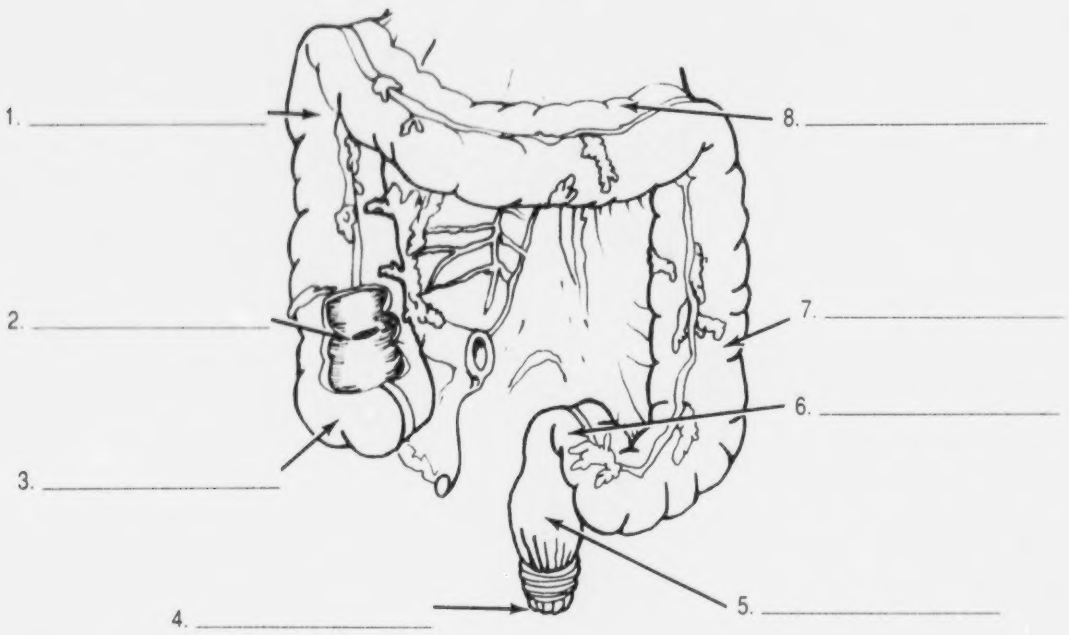
OBJECTIVE 14 | Label the portions of the small intestine.



May be photocopied for student use.

420

OBJECTIVE 15 | **Label segments of the large intestines.**



OBJECTIVE 16 | **Distinguish between the functions of the small intestine and the large intestine.** Write an "S" in the blanks before functions of the small intestine and a "L" in the blanks before functions of the large intestine.

_____ 1. Reabsorbs water, mineral salts, and vitamins

_____ 2. Secretes mucus to aid in the movement of feces

_____ 3. Digests and absorbs the greater part of food

_____ 4. Provides a site for bacteria which produce Vitamin K and other bacteria that aid in absorption

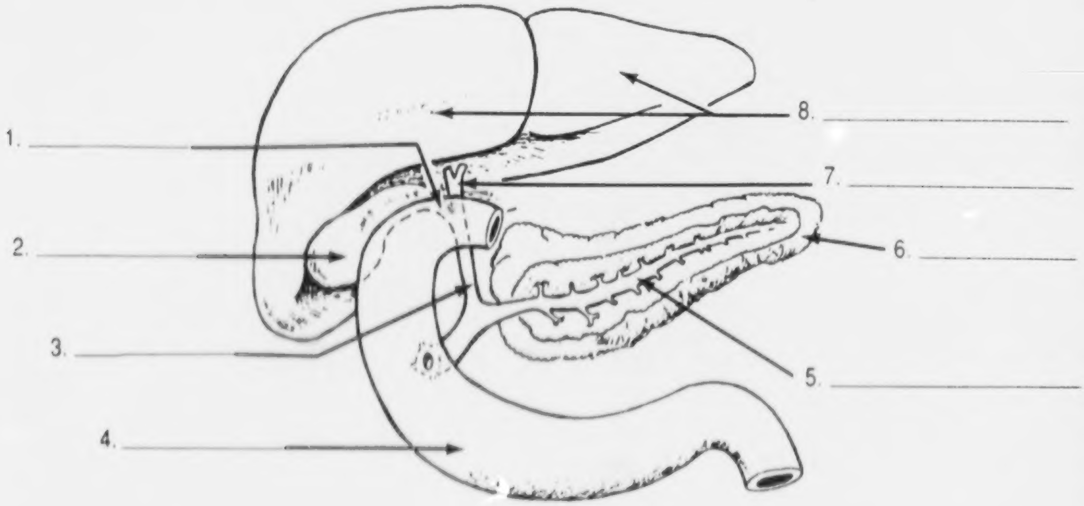
_____ 5. Receives bile from the gall bladder and pancreatic juice from the pancreas

_____ 6. Secretes intestinal juices

May be photocopied for student use.

OBJECTIVE 17

Label the accessory structures.



OBJECTIVE 18

Select the word or phrase that completes statements about the functions of the accessory structures. Write the correct letter in the blank.

_____ 1. The liver does all of the following EXCEPT

- a. manufacture cholesterol
- b. form antibodies
- c. produce bile
- d. produce hydrochloric acid

May be photocopied for student use

_____ 2. Worn out red blood cells are

a. absorbed by the liver
b. repaired by the liver
c. removed by the liver
d. not allowed into the liver

_____ 3. The gallbladder

a. produces bile
b. stores bile
c. absorbs bile
d. removes bile

_____ 4. The pancreatic duct carries enzymes from the pancreas to the

a. gall bladder
b. liver
c. duodenum
d. stomach

_____ 5. The hepatic duct connects the liver to the

a. common bile duct, then to the duodenum
b. pancreatic duct, then to the duodenum
c. common bile duct, then to the gallbladder for storage
d. pancreatic duct, then to the gallbladder for storage

_____ 6. When food is not being digested, bile from the duodenum backs up into the cystic duct and

a. is expelled as waste
b. is moved to the liver for storage
c. is moved to the gallbladder for storage
d. cleans the small intestine

OBJECTIVE 19

Distinguish between mechanical and chemical digestion. Write an "M" in the blanks before statements about mechanical digestion and a "C" in the blanks before statements about chemical digestion.

_____ 1. Food is broken into smaller particles.

_____ 2. It begins in the mouth with chewing and continues along the alimentary tract with swallowing in the esophagus, churning action in the stomach, and peristalsis in the small intestine.

May be photocopied for student use.

_____ 3. Fats are turned into fatty acids in the small intestine.

_____ 4. Nutrients are absorbed through the villi in the small intestine into the blood and lymph systems.

_____ 5. Digestive juices and foods are moistened and mixed.

_____ 6. Digestive juices and enzymes cause chemical changes in the food.

_____ 7. Carbohydrates are changed to simple sugars in the mouth and small intestine.

_____ 8. Muscles in the tongue, jaw, pharynx, esophagus, stomach, and intestines furnish the needed power.

_____ 9. Food is moved along the digestive tract.

_____ 10. Proteins are changed into amino acids in the stomach and small intestine.

OBJECTIVE 20 **Complete a chart of the digestive process.** Write the correct information in the boxes.

Site	Secretion	Enzyme	Works on	Final Product
1.	Saliva	Salivary amylase (ptyalin)	2.	Simple Starches (maltose)
Stomach	3.	4.	Protein	Polypeptides
Intestines and pancreas	Pancreatic juice and bile	Trypsin	Polypeptides	5.
		Pancreatic amylase	Carbohydrates	Glucose, maltose
		6.	7.	Fatty acids and glycerols
		Lactase, maltase, and sucrase	Lactose, maltose, and sucrose	Simple sugars (glucose, fructose, galactose)

May be photocopied for student use.

OBJECTIVE 21

Arrange in order steps in the mechanism of rectal reflex. Write a "1" in the blank before the first step, a "2" in the blank before the second, etc.

_____ 1. The sigmoid and rectum become distended with fecal material.

_____ 2. The muscle walls of the rectum are excited.

_____ 3. Impulses are transmitted to the spinal cord.

_____ 4. The walls of the rectum contract and the internal sphincter relaxes

OBJECTIVE 22

Select from a list factors that affect basal metabolism rate (BMR). Write an "X" in the blank before factors that affect basal metabolism rate.

_____ 1. Climate

_____ 2. Internal secretions

_____ 3. Race or ethnic heritage

_____ 4. Age

_____ 5. Body shape and size

_____ 6. Physical position

_____ 7. Sex

_____ 8. Emotional stress

NOTE: Objective 23 is evaluated on a job sheet\assignment sheet in this unit. If you have not completed this component, see your instructor.

May be photocopied for student use

WRITTEN TEST ANSWERS

THE DIGESTIVE SYSTEM

OBJECTIVE 1

Part I		Part II	
1.	a	1.	n
2.	h	2.	h
3.	c	3.	g
4.	o	4.	e
5.	j	5.	a
6.	k	6.	b
7.	i	7.	m
8.	m	8.	i
9.	f	9.	k
10.	d	10.	c

OBJECTIVE 2

Answer should include:

- Breaks down food and prepares it for absorption and utilization
- Absorbs digested food materials
- Discharges waste products

OBJECTIVE 3

1.	c	6.	k
2.	j	7.	d
3.	a	8.	i
4.	h	9.	b
5.	e		

OBJECTIVE 4

1. Enamel
2. Pulp cavity
3. Periodontal tissue
4. Dentin
5. Cementum
6. Fifth cranial nerve
7. Root
8. Neck
9. Crown

OBJECTIVE 5

1. c 6. f
2. g
3. e
4. i
5. b

OBJECTIVE 6

1. Teeth
2. Hard palate
3. Soft palate
4. Uvula
5. Tongue
6. Gums

OBJECTIVE 7

1. Parotid
2. Sublingual
3. Submaxillary or submandibular

OBJECTIVE 8

2, 3, 5

OBJECTIVE 9

1. Parotid gland
2. Pharynx
3. Epiglottis
4. Esophagus
5. Liver
6. Gallbladder
7. Cecum
8. Appendix
9. Anal canal
10. Rectum
11. Sigmoid
12. Small intestine
13. Large intestine or colon
14. Pancreas
15. Stomach
16. Submaxillary gland
17. Sublingual gland
18. Oral cavity or mouth

OBJECTIVE 10

1, 4, 5

OBJECTIVE 11

1. Cardiac sphincter
2. Pyloric sphincter
3. Pylorus
4. Body
5. Fundus

OBJECTIVE 12	1.	b
	2.	a
	3.	a
OBJECTIVE 13	1.	a
	2.	c
	3.	b
	4.	f
	5.	d
OBJECTIVE 14	1.	Ileum
	2.	Appendix
	3.	Jejunum
	4.	Duodenum
OBJECTIVE 15	1.	Ascending colon
	2.	Ileocecal valve
	3.	Cecum
	4.	Anus
	5.	Rectum
	6.	Sigmoid colon
	7.	Descending colon
	8.	Transverse colon

OBJECTIVE 16

1. L
2. L
3. S
4. L
5. S
6. S

OBJECTIVE 17

1. Cystic duct
2. Gallbladder
3. Common bile duct
4. Duodenum
5. Pancreatic duct
6. Pancreas
7. Hepatic duct
8. Liver

OBJECTIVE 18

1. d
2. c
3. b
4. c
5. a
6. c

OBJECTIVE 19

1. M
2. M
3. C
4. M
5. M
6. C
7. C
8. M
9. M
10. C

OBJECTIVE 20

1. Mouth
2. Starch
3. Gastric juice
4. Pepsin
5. Amino acids
6. Bile
7. Fats

OBJECTIVE 21

1. 1
2. 3
3. 2
4. 4

OBJECTIVE 22

1, 2, 4, 5, 7, 8

OBJECTIVE SHEET

THE BLOOD

VIII

INTRODUCTION

Blood. It can bring a variety of images to our minds. From Dracula to "the gift of life," from our scraped knees to movie scenes when we covered our eyes, blood always evokes a reaction. Perhaps by instinct, we know that blood is vital. Today, medicine uses it as a tool for diagnosis and research. We can replace it and store it. Yet, our knowledge of blood is still far from complete.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify the components, functions, and characteristics of blood, blood types, and Rh factors. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with blood to their definitions.
2. Select from a list functions of blood
3. Choose the word or phrase that completes statements about the physical characteristics of blood.
4. Select from a list principal components of blood plasma.
5. Distinguish among types of normal blood cells.
6. Define hemoglobin and hematocrit.
7. Complete a chart of normal ranges of hematocrit, red blood cells, white blood cells, and platelets.
8. Arrange in order steps in the blood clotting process.
9. Complete a chart of blood types.
10. Select from a list true statements about Rh factor.
11. Communicate about blood. (Assignment Sheet)

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Order materials to supplement unit.
- Invite a medical research specialist to discuss the characteristics of blood.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. You may want to supply the Objective Sheet, Information Sheet and any other components you want covered. Confirm the scheduled appearance 2-3 days prior to the presentation.

- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.
  - Assist students in scheduling and presenting prepared and extemporaneous speeches.
  - Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.

- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with blood to their definitions.

- This objective includes more terms than most other units. Encourage students to draw pictures or make charts to help them distinguish terms from one another.
- Arrange spelling bees or other related games.
- Throughout the unit, refer to terms in this objective as related topics are discussed.

Objective 2: Select from a list functions of blood.

- Have students compare skeletal, muscular, and blood functions.
- Have students list other systems that relate to each function.

Objective 3: Choose the word or phrase that completes statements about the physical characteristics of blood.

- Begin the objective by asking students to list characteristics of blood they are familiar with (it's red, it's liquid, how it smells, etc.).
- Define and explain pH and specific gravity.

Objective 4: Select from a list principal components of blood plasma.

- Relate components to functions listed in Objective 2.
- Provide photographs or drawings of microscopic slides of plasma.
- List tests and measurements used for each component.
- Show Transparency 1.

Objective 5: Distinguish among types of normal blood cells.

- Relate each type of cell to functions of blood listed in Objective 2.
- Provide drawings of each type of cell.
- Allow students to sample and view blood cells with a microscope.
- Refer students to Supplements 1 and 2.

Objective 6: Define hemoglobin and hematocrit.

Objective 7: Complete a chart of normal ranges of hemoglobin, hematocrit, red blood cells, white blood cells, and platelets.

- Discuss hemoglobin and hematocrit as diagnostic tools.
- Explain scientific notation to students.
- Discuss why different measurements are used.
- Discuss relationships between different tests.
- Explain to students that acceptable ranges will vary with different agencies, depending upon procedures and equipment. Also discuss variations due to age, sex, etc.

Objective 8: Arrange in order steps in the blood clotting process.

- Have students draw illustrations or diagrams that will help them remember the steps of the clotting process.
- Discuss the importance of proper clotting.

Objective 9: Complete a chart of blood types.

- Have students determine their own blood type.
- Discuss genetics and blood typing.
- Have students determine their own blood type and what types they can donate to or receive from.
- Refer students to Supplement 3.
- Have the class participate in a blood drive as a service project.

Objective 10: Select from a list true statements about Ph factor.

- Students will probably be most familiar with Rh factors and pregnancy. Begin by describing what happens during initial and subsequent pregnancies, and the medical treatments available.

- Have students discuss why the father's Rh is or is not important.

APPLICATION

Objective 11: Communicate about blood.

- Have student complete the assignment sheet to increase their understanding of blood and its role in good health.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.

- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Opportunities for Learning, Inc.*, 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700 offers the following:

  Blood in the Human Body and Blood Factors, Human Systems Filmstrip Sets. Covers blood elements, functions, normal ranges, types, transfusion reactions, and Rh factors.

Blood: River of Life Mirror of Health Videotape. Two-part series on the blood and its importance. "The River" covers blood components and functions; "The Mirror" covers blood testing and analysis.

Blood Videotape, enhanced video from filmstrip. Covers the blood and its functions, blood types, platelets and related diseases, active and passive immunity, AIDS, blood products, substitutes, storage, and processing. Includes information about the American Red Cross.

Your Body: Series II, Your Body Video and Filmstrip Series. Video from filmstrip. Includes three sections: "Your Digestive System: A Food Laboratory," "Your Blood: Liquid Tissues," and "Your Circulatory System: The Body's Highways." "Your Blood: Liquid Tissues" covers the characteristics and functions of RBCs WBCs, platelets, plasma, and blood.

Software

- *The Human Systems Software Series, Human Systems - Series I.* Software, lesson planner with instructions, educational objectives, program sequence, scoring criteria. titles include "The Human Organism," "Your Digestive System," "Your Blood," and "Your Circulatory System." Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700.

UNIT REFERENCES

- Kellum, Mary, *Anatomy and Physiology*, Mid-America Vocational Curriculum Consortium, Inc., Stillwater, Oklahoma, 1984.
- Hellemans, Alexander and Bryan Bunch, *The Timetables of Science*, Simon and Schuster, New York, 1988.

437

THE BLOOD VIII

OBJECTIVE 1

Match terms associated with blood to their definitions.

- **agglutination** – clumping of blood cells when incompatible bloods are mixed
- **anemia** – a deficiency of red blood cells or hemoglobin or both
- **anticoagulant** – an agent which prevents or delays the formation of blood clots.
- **bone marrow puncture** – insertion of a hollow needle into the marrow cavity of a flat bone to withdraw a sample of bone marrow
- **coagulation** – clotting of blood
- **corpuscles** – blood cells
- **electrolyte** – a solution that conducts electricity
- **embolus** – a clot that is floating in the bloodstream
- **erythrocytes** – red blood cells that transport oxygen to the cells and carbon dioxide from the cells

  NOTE: Erythrocytes originate in red bone marrow.
- **fibrin** – the fibrous protein formed as blood is clotting
- **formed elements** – cells of blood; the part of blood that is not plasma
- **gamma globulin** – the portion of blood that contains antibodies
- **hematology** – the study of blood
- **hemostasis** – the stoppage of bleeding
- **heparin** – a substance that prevents clotting
- **homeostasis** – state of chemical balance between the cell and its environment
- **hemolysis** – destruction of red blood cells that sets hemoglobin loose in the surrounding fluid

- **hemorrhage** – an abnormally large discharge of blood, either internally or externally

- **infusion** – introduction of a therapeutic liquid into the body through a vein

- **leukocytes** – white blood cells that aid in fighting infection; formed in red bone marrow, spleen and other lymph tissues.

  NOTE: "Leuko-" means white.

- **lipids** – a group of fat or fat-like substances that are insoluble in water

- **megakaryocyte** – a large nucleus cell

  NOTE: "Mega-" means large, "Karyon" means nucleus.

- **phagocytes** – a cell that is able to engulf and ingest particles that are harmful to the body

- **plasma** – the liquid portion of blood

- **prothrombin** – a substance in the blood that mixes with calcium to form thrombin

- **shock** – depression of body functions due to circulatory system failure

- **thrombus** – a clot that obstructs a blood vessel or a heart cavity

- **thromboplastin** – a substance that speeds clotting

- **transfusion** – injection of the blood of one person into the blood vessels of another

OBJECTIVE 2 **Select from a list functions of blood.**

Transports needed elements and waste.

- Carries oxygen from the lungs to tissues and carbon dioxide from the tissues to the lungs

- Moves nutrients from the digestive tract to tissues and waste products from the tissues to the excretory organs

- Transports hormones from glands to various organs

- Distributes heat generated by muscle tissue throughout the body

Maintains homeostasis

- Affects pH (acid-base) balance
- Controls electrolyte balance
- Maintains fluid balance
- Regulates body temperature

Combats infection

- Fights infections

  NOTE: Leukocytes attack and absorb foreign bodies, including microorganisms that cause infection

- Maintains immunities

OBJECTIVE 3

Choose the word or phrase that completes statements about the physical characteristics of blood.

- Blood makes up approximately seven percent of body weight.
- The average adult body has four to five liters (about five quarts) of blood.
- Blood is slightly alkaline, with a pH of 7.35 to 7.45.
- Blood is 55% plasma and 45% formed elements.
- Oxygenated blood is bright red; deoxygenated blood is purple or deep red.
- Blood has a specific gravity of 1.050 to 1.065, meaning it is slightly heavier than water.

OBJECTIVE 4

Select from a list principal components of blood plasma.

Water comprises about 90% of blood plasma and acts as a carrier for the remaining 100 or so components.

The remaining 10% is comprised of:

- Electrolytes such as mineral salts
- Nutrients, primarily glucose, amino acids, and fats
- Metabolic wastes
- Respiratory gases such as oxygen and carbon dioxide

- Regulatory substances such as hormones or enzymes
- Protective substances such as antibodies

OBJECTIVE 5

Distinguish among types of normal blood cells.

NOTE: See Supplements 1 and 2.

Erythrocytes (also called red blood cells, RBCs, or red corpuscles) are produced and stored in the red bone marrow and are present in the bloodstream, spleen, and other lymphatic tissues. They transport oxygen and carbon dioxide. They are very small, disc-shaped cells that are thicker at the edges that in the middle. When mature, they have no nucleus and can grow no further. There are 4-6 million RBCs per cubic millimeter (mm^3). Erythrocytes have an average lifespan of 120 days.

Leukocytes (also called white blood cells, white corpuscles, or WBCs) fight infection. There are several types of leukocytes, which differ in shape, nucleus, function, point of origin, and life span. They are all colorless, not white. The average leukocyte life-span is nine days. They move in and out of blood vessels by passing between the vessel wall cells. An increased number of leukocytes usually indicates infection.

White blood cells are divided into two groups, **granulocytes** and **granulocytes**. An agranulocyte has a round nucleus and no granules in the cytoplasm. A granulocyte has a lobed nucleus and granules in the cytoplasm.

Platelets (also called thrombocytes) aid in coagulation of blood. They are found in red bone marrow and are irregular in size and shape. They are fragile and break easily under stress. They can be seen in clusters. Platelets have a life span of 1 to 4 days.

OBJECTIVE 6

Define hemoglobin and hematocrit.

Hemoglobin and Hematocrit (called H&H) are important diagnostic tools.

- Hemoglobin is the amount of protein and iron that carry oxygen within a red blood cell. When oxygenated, it gives blood the bright red color.
- Hematocrit is the percentage of red blood cells per total blood volume.

OBJECTIVE 7

Complete a chart of normal ranges of hematocrit, red blood cells, white blood cells, and platelets.

	Male	Female
Hemoglobin	14-18 g/dl	12-16 g/dl
Hematocrit	42-52%	37-47%
RBCs	$4.7\text{-}6.1 \times 10^6$	$4.2 - 5.4 \times 10^6$
WBCs	$4.8\text{-}10.8 \times 10^3$	$4.8\text{-}10.8 \times 10^3$
Platelets	$130\text{-}400 \times 10^3$	$130\text{-}400 \times 10^3$

OBJECTIVE 8

Arrange in order steps in the blood clotting process.

Clotting inside the vessels is usually prevented by heparin and the smooth vessel walls. When a vessel is torn or broken, clots form to control blood loss.

1. When trauma or other conditions occur, bleeding begins and fragile platelets are damaged.
2. Damaged platelets release thromboplastin.
3. The liver releases the chemical prothrombin.
4. The prothrombin changes thromboplastin to form strings of fibrin.
5. A mesh network of fibrin catches red blood cells.
6. The network and red blood cells form a clot, called a thrombus.

OBJECTIVE 9

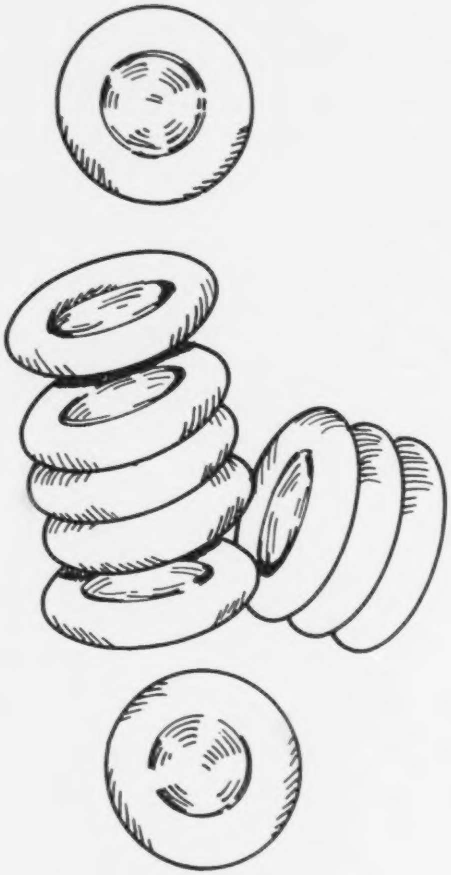
Complete a chart of blood types.

Blood Type	Donates to	Receives from	% of population with this type
A	A or AB	A or O	40
B	B or AB	B or O	10
AB	AB	any type	4
O	any type	O	46

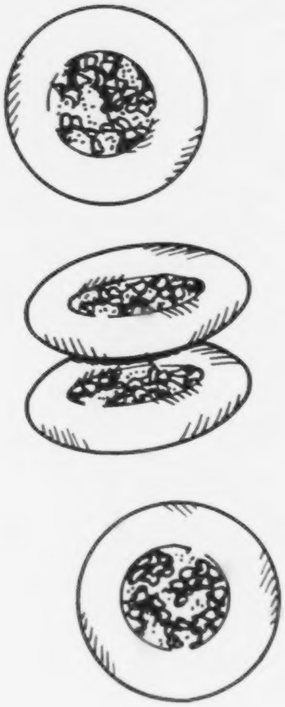
OBJECTIVE 10 **Select from a list true statements about Rh factor.**

- Approximately 85% of the population have a red blood cell protein called the Rh factor; these people are Rh positive.
- Approximately 15% of the population does not have this protein; these people are Rh negative.
- When Rh positive blood is given to an Rh negative person, the recipient's Rh negative blood may produce counteracting proteins, called antibodies, which destroy the red cells from the Rh positive blood; this does not happen when Rh negative blood is given to an Rh positive recipient.
- An Rh negative mother may become sensitized by proteins from an Rh positive baby. During subsequent pregnancies, the mother's antibodies may pass into the blood of the fetus and cause erythroblastosis fetalis, a destruction of red blood cells.

Red Blood Cells



Mature

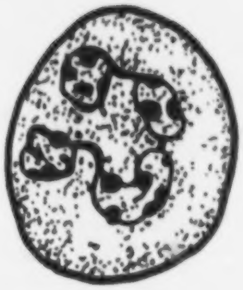


Immature
(Note the nucleation.)

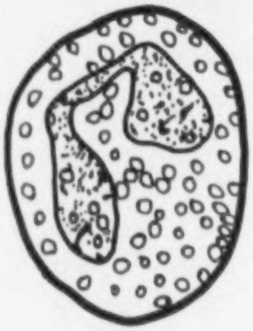
(Note the concave surfaces.)

White Blood Cells and Platlets

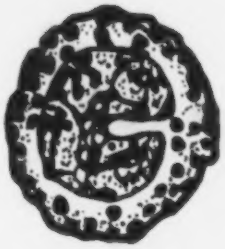
Granulocytes



Neutrophil
(stains neutral color in tests)

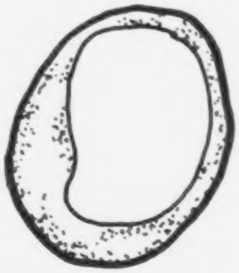


Eosinophil
(stains red)

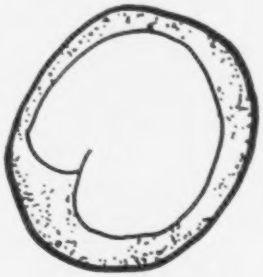


Basophil
(stains deep blue/purple)

Agranulocytes

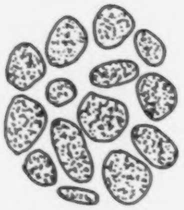


Lymphocyte



Monocyte

Platlets



(Thrombocytes)

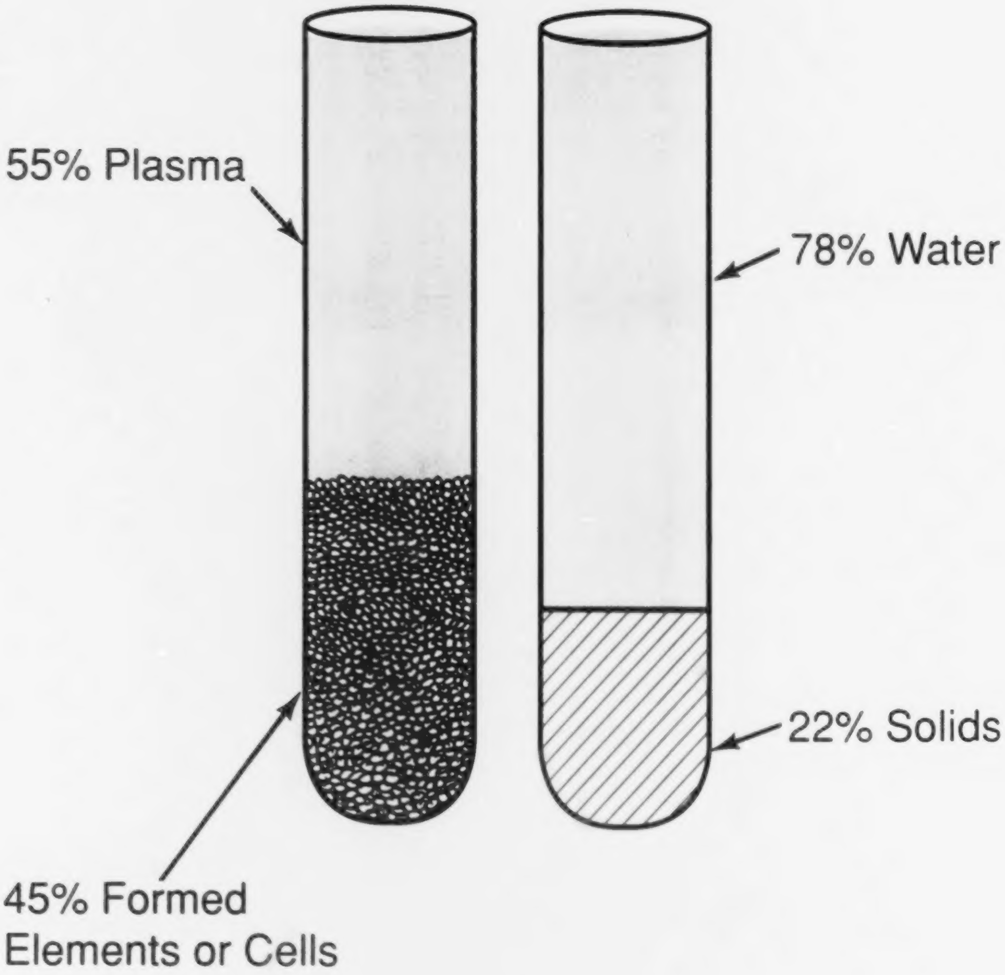
Blood typing is one of the greatest discoveries in history. For centuries, the idea of transferring the blood of one person to another was popular, but unsuccessful. For example, in ancient Rome, those most favored by the emperor were allowed into the arena to drink the blood of fallen gladiators. In other parts of Europe, drinking or bathing in the blood of virgins was reputed to prevent aging. Records exist of fathers selling their daughters to members of the aristocracy for this purpose.

In 1666, Richard Lower completed the first successful scientific blood transfusion between two dogs. The following year, Jean-Baptiste Denis transferred lamb's blood to a sick boy. When the boy recovered, he was hailed as a hero, but when his next two patients died, he was tried for murder and transfusions were outlawed in France. Shortly afterwards, the Pope was treated with a transfusion and also died. This ended any transfusion research for almost 250 years.

In 1900, however, blood types were identified by Austrian doctor Karl Landsteiner. By 1905, live transfusions were being performed on humans.

During World War II, Dr. Edwin J. Cohn discovered the procedure for separating blood plasma. This allowed storage of blood for later use. His methods have saved countless lives. In 1953, however, Dr. Cohn was involved in an automobile accident in Boston. Though the accident occurred in front of a local hospital and Dr. Cohn was seriously injured, he was denied treatment because he was black. During the ambulance transfer to another hospital, he bled to death.

Compostition of Blood


55% Plasma
78% Water
22% Solids
45% Formed Elements or Cells

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization
  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language
  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing self confidence/esteem

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:
  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.
  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.
- If students have difficulty adapting their presentation to a specific audience:
  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.
  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.
- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

- If students have difficulty developing self confidence/esteem:

  - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.

  - Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.

  - Allow the students to work in heterogenous groups to enable the less confident students to learn fron the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE BLOOD

VIII

Name ______________________________ Score ____________

OBJECTIVE 11 **Communicate about blood.**

INTRODUCTION What does blood do? Surprisingly, even though everyone is familiar with blood and understands it is important, few people can actually explain what blood does for us.

DIRECTIONS Prepare a poster, brochure, skit, speech, or cartoon about one function of blood.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (oral & written)

Job Acquisition/ Development Skills
- Develop self confidence/esteem

THE BLOOD

ASSIGNMENT SHEET	Work should be completed to the satisfaction of the instructor. Check that all HOSA guidelines are followed, that the effect listed is correct, and that instructions are correctly followed.

WRITTEN TEST

THE BLOOD

VIII

Name ______________________________ Score ____________

OBJECTIVE 1

Match terms associated with blood to their definitions.

Part I

_____ 1. Clumping of blood cells when incompatible bloods are mixed

_____ 2. Red blood cells that transport oxygen to the cells and carbon dioxide from the cells

_____ 3. Injection of the blood of one person into the blood vessels of another

_____ 4. Destruction of red blood cells that sets hemoglobin loose in the surrounding fluid

_____ 5. White blood cells that aid in fighting infection; formed in red blood marrow, spleen, and other lymph tissues

_____ 6. The stoppage of bleeding

_____ 7. Cells of blood; the part of blood that is not plasma

_____ 8. A large nucleus cell

_____ 9. A group of fat or fat-like substances that are insoluble in water

_____ 10. The state of chemical balance between the cell and its environment

a. agglutination
b. anemia
c. anticoagulant
d. erythrocytes
e. formed elements
f. gamma globulin
g. hemostasis
h. homeostasis
i. hemolysis
j. leukocytes
k. lipids
l. megakaryocyte
m. phagocytes
n. plasma
o. transfusion

May be photocopied for student use.

Part II

_____ 1. An abnormally large discharge of blood, either internally or externally

_____ 2. An agent which prevents or delays the formation of blood clots

_____ 3. Blood cells

_____ 4. A cell that is able to engulf and ingest particles that are harmful to the body

_____ 5. A clot that is floating in the bloodstream

_____ 6. A clot that obstructs a blood vessel or a heart cavity

_____ 7. Clotting of blood

_____ 8. A deficiency of red blood cells or hemoglobin or both

_____ 9. Depression of body functions due to circulatory system failure

_____ 10. The fibrous protein formed as blood is clotting

a. agglutination
b. anemia
c. anticoagulant
d. coagulation
e. corpuscles
f. electrolyte
g. embolus
h. fibrin
i. formed elements
j. hemorrhage
k. heparin
l. lipids
m. phagocytes
n. shock
o. thrombus

May be photocopied for student use.

Part III

_____ 1. Insertion of hollow needle into the narrow cavity of a flat bone to withdraw a sample of bone marrow

_____ 2. Introduction of a therapeutic liquid into the body through a vein

_____ 3. The liquid portion of blood

_____ 4. The portion of blood that contains antibodies

_____ 5. A solution that conducts electricity

_____ 6. The study of blood

_____ 7. A substance in the blood that mixes with calcium to form thrombin

_____ 8. A substance that prevents clotting

_____ 9. A substance that speeds clotting

a. agglutination
b. bone marrow puncture
c. corpuscles
d. electrolyte
e. fibrin
f. gamma globulin
g. hematology
h. heparin
i. infusion
j. leukocytes
k. phagocytes
l. plasma
m. prothrombin
n. thromboplastin

OBJECTIVE 2

Select from a list functions of blood. Write an "X" in the blank before functions of blood.

_____ 1. Changes oxygen to carbon dioxide

_____ 2. Digests food

_____ 3. Transports hormones

_____ 4. Maintains fluid balance

_____ 5. Maintains pH and electrolyte balance

_____ 6. Moves nutrients and waste products

_____ 7. Carries messages from the brain to some tissues

_____ 8. Fights infection

_____ 9. Distributes heat

May be photocopied for student use.

_____ 10. Regulates body temperature

_____ 11. Maintains immunities

_____ 12. Provides hydraulic pressure in joints

OBJECTIVE 3

Choose the word or phrase that completes statements about the physical characteristics of blood. Write the correct letter in the blank.

_____ 1. Blood is 45% formed elements and 55%

a. red blood cells
b. oxygen
c. iron
d. plasma

_____ 2. Deoxygenated blood is purple or

a. deep blue
b. deep red
c. bright red
d. bright blue

_____ 3. The specific gravity of blood indicates that it is

a. lighter than water
b. about as heavy as water
c. much heavier than water
d. slightly heavier than water

_____ 4. The average adult body has four to five

a. pints of blood
b. liters of blood
c. gallons of blood
d. milliliters of blood

May be photocopied for student use

_____ 5. Blood is slightly

a. alkaline

b. acid

c. base

d. neutral

_____ 6. Bright red blood is

a. oxygenated

b. deoxygenated

c. hydrogenated

d. homogenized

OBJECTIVE 4

Select from a list principal components of blood plasma. Write an "X" in the blank before principal components.

_____ 1. Water

_____ 2. Fatty acids

_____ 3. Glucose

_____ 4. Bilirubin

_____ 5. Metabolic wastes

_____ 6. Hormones

_____ 7. Erythrocytes

_____ 8. Enzymes

_____ 9. Antibodies

_____ 10. Oxygen

May be photocopied for student use

OBJECTIVE 5

Distinguish among types of normal blood cells. Write an "E" in the blanks before statements about erythrocytes; an "L" before statements about leukocytes; a "P" before statements about platelets, and "A" before statements about agranulocytes and granulocytes; and an "H" before statements about hemoglobin and hematocrit.

_____ 1. Fight infection

_____ 2. Have no nucleus when mature

_____ 3. Average life span of 120 days

_____ 4. Move in and out of blood vessels by passing between the vessel wall cells

_____ 5. Are produced and stored in the red bone marrow and are present in the bloodstream, spleen, and other lymphatic tissue

_____ 6. Differ in shape, nucleus, function, point of origin, and life span

_____ 7. Are colorless

_____ 8. Can have a round nucleus and no granules or a lobed nucleus with granules

_____ 9. Found in red bone marrow and are irregular in size and shape

_____ 10. Are white blood cells

OBJECTIVE 6

Define hemoglobin and hematocrit. Write the definition for each word.

1. ____

____

____

2. ____

____

____

May be photocopied for student use.

OBJECTIVE 7

Complete a chart of normal ranges of hematocrit, red blood cells, white blood cells, and platelets.

	Male	Female
Hemoglobin		
Hematocrit		
RBCs		
WBCs		
Platelets		

OBJECTIVE 8

Arrange in order steps in the blood clotting process. Write a "1" in the blank before the first step, a "2" before the second step, etc.

_____ 1. When trauma or other conditions occur, bleeding begins and fragile platelets are damaged.

_____ 2. The prothrombin changes thromboplastin to form strings of fibrin.

_____ 3. The network and red blood cells form a clot, called a thrombus.

_____ 4. Damaged platelets release thromboplastin.

_____ 5. The liver releases the chemical prothrombin.

_____ 6. A mesh network of fibrin catches red blood cells.

OBJECTIVE 9

Complete a chart of blood types.

Blood Type	Donates to	Receives from	% of population with this type
A		A or O	
B	B or AB		
AB	AB		
O			46

May be photocopied for student use.

OBJECTIVE 10

Select from a list true statements about Rh factor. Write an "X" in the blank before each true statement.

_____ 1. Approximately 85% of the population have a red blood cell protein called the Rh factor; these people are Rh positive.

_____ 2. Once an Rh negative mother develops antibodies, later pregnancies will not be affected by her Rh factor.

_____ 3. Approximately 35% of the population are Rh negative.

_____ 4. Approximately 15% of the population are Rh negative.

_____ 5. When Rh positive blood is given to an Rh negative person, the recipients' Rh negative blood may produce antibodies which destroy the red cells from the Rh positive blood.

_____ 6. When Rh negative blood is given to an Rh positive person, the recipient's Rh positive blood may create antibodies that destroy the recipient's own red cells.

_____ 7. An Rh negative mother may become sensitized by proteins from an Rh positive baby, endangering subsequent pregnancies.

NOTE: Objective 11 is evaluated on the job sheet/assignment sheet in this unit. If you have not completed this component, see your instructor.

May be photocopied for student use

WRITTEN TEST ANSWERS

THE BLOOD

VIII

OBJECTIVE 1

Part I

1. a
2. d
3. o
4. i
5. j
6. g
7. e
8. l
9. k
10. h

Part II

1. j
2. c
3. e
4. m
5. g
6. o
7. d
8. b
9. n
10. h

Part III

1. b
2. i
3. l
4. f
5. d
6. g
7. m
8. h
9. n

OBJECTIVE 2

3, 4, 5, 6, 8, 9, 10, 11

OBJECTIVE 3

1. d
2. b
3. d
4. b
5. a
6. a

OBJECTIVE 4

1, 3, 5, 6, 8, 9, 10

OBJECTIVE 5

1. L
2. E
3. E
4. L
5. E
6. L
7. L
8. A
9. P
10. A

OBJECTIVE 6

Hemoglobin is the amount of protein and iron that carry oxygen within a red blood cell. When oxygenated, it gives blood its bright red color.

Hematocrit is the percentage of red blood cells per total blood volume.

OBJECTIVE 7

	Male	Female
Hemoglobin	14-18 g/dl	12-16 g/dl
Hematocrit	42-52%	37-47%
RBCs	$4.7\text{-}6.1 \times 10^{6}$	$4.2 - 5.4 \times 10^{6}$
WBCs	$4.8\text{-}10.8 \times 10^{3}$	$4.8\text{-}10.8 \times 10^{3}$
Platelets	$130\text{-}400 \times 10^{3}$	$130\text{-}400 \times 10^{3}$

OBJECTIVE 8

1. 1
2. 4
3. 6
4. 2
5. 3
6. 5

OBJECTIVE 9

Blood Type	Donates to	Receives from	% of population with this type
A	A or AB	A or O	40
B	B or AB	B or O	10
AB	AB	any type	4
O	any type	O	46

OBJECTIVE 10 1, 4, 5, 7

OBJECTIVE SHEET

THE HEART

IX

INTRODUCTION

The heart symbolizes many things: love, passion, life. It's not surprising that the heart stands for such important things, because the heart provides the force needed to circulate life-giving blood throughout the body.

In our culture, stress, lack of exercise, and poor diet practices increase the incidence of heart trouble. As the population becomes more concerned about these problems, health care workers must be able to understand and share their knowledge about the heart, its functions, and the lifestyle changes that promote a healthy heart.

UNIT OBJECTIVE

After completing this unit, the student will be able to recall and identify structures and functions of the heart and be able to research and present information about the heart. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the heart to their definitions.
2. State functions of the heart.
3. Label structures of the heart.
4. Match structures of the heart to their descriptions.
5. Distinguish among blood vessels.
6. Select from a list true statements about the blood supply to the heart.
7. Choose the word or phrase that completes statements about the physiology of the heart.
8. Arrange in order steps in the flow of blood through the heart.
9. Communicate about how the heart works. (Assignment Sheet)

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Order materials to supplement the unit.
- Invite a guest speaker to discuss the heart, common heart problems, effects of modern life on the heart, new tests and treatments, and ways to promote a healthy heart.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. Confirm the scheduled appearance 2-3 days prior to the presentation.
- Obtain models and large pictures of the heart. Include diagrams or models of the heart pumping cycle and route of blood through the heart. Models may be obtained from Health Edco, P.O. Box 21207, Waco, TX 76702-1207, 1-800-299-3366, fax 1-817-751-0221.
- Prepare a bulletin board showing the heart and recent news items related to heart diseases and treatments.
- Devise games and/or crossword puzzles to reinforce terms, groupings, etc.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.

- Arrange for photographs of all public speaking, presentations, or other public contact.
- Host terminology and spelling contests.
- Assist students in scheduling and presenting prepared and extemporaneous speeches.
- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

- Discuss the unit goal.
- Explain that the next two units are closely related. Discuss the heart and the circulatory system briefly.

Objective 1: Match terms associated with the heart to their definitions.

- Discuss terms associated with the heart.
- Explain to students that these terms will also be used in Unit 10, The Circulatory System.
- Have students work crossword puzzles using terms.
- Some terms, such as *cusp*, may be familiar in different areas. Have students discuss where they have heard the terms before and why the same term is used both places.
- Use Transparency Master 1 to illustrate bicuspid valves.

Objective 2: State functions of the heart.

- Discuss functions of the heart and why they are important.
- Note other systems working with the heart.
- Have students brainstorm and list ways the heart is similar to other machines or systems.
- Discuss the concepts of heart-death and brain-death.

467

Objective 3: Label structures of the heart.

Objective 4: Match structures of the heart to their descriptions.

- Discuss structures of the heart.
- Display pictures or models showing structures of the heart.
- Use a variety of illustrations to identify heart structures. Point out landmarks that identify each chamber and valve so students will be able to identify them in views that are not frontal.
- Present examples of radiographs, MRI prints, etc. and identify the different heart structures in each.
- Use Transparency Masters 2 and 3 to illustrate the heart structure and coronary arteries.

Objective 5: Distinguish among blood vessels.

- Discuss vessels that supply the heart with blood.
- Explain that the heart is a muscle and must be supplied with nutrients, just like any other muscle.
- Discuss briefly the cause and effect of damage or blockage in these vessels.
- Use Transparency Master 4 to illustrate capillary actions.

Objective 6: Select from a list true statements about the blood supply to the heart.

- Display pictures or models which show the vessels.
- Explain the differences between arteries and veins. Tell students that veins are blue in most diagrams, while arteries are red, and discuss why.
- Have students identify arteries visible under their skin.

  NOTE: Arteries, veins, and capillaries will be discussed further in Unit 10.

- Use Transparency Master 5 to illustrate the heart's blood supply.

Objective 7: Choose the word or phrase that completes statements about the physiology of the heart.

Objective 8: Arrange in order steps in the flow of blood through the heart.

- Discuss the phases in the operation of the heart.
- Discuss how each action can be measured and assessed.
- Have students listen to heart beats of other students with stethoscopes.
- Let students trace the flow of the blood through the heart. Use a three-dimensional model, if possible.
- Use Transparency Masters 6 and 7 to illustrate the conduction system and pumping cycle.

APPLICATION

Objective 9: Communicate about how the heart works.

- Have students complete Assignment Sheet 1 to promote the healthy functioning of the heart.
- Use Assignment Sheet 1 to meet HOSA guidelines.
- Encourage students to be creative in their presentations. Suggestions could include:
  - Using sign language to give a presentation on ways the heart works.
  - Writing and presenting a short skit or puppet show about the heart. A local elementary school health fair, school, or day care center might be a good place to present it.
  - Writing and recording an audio tape about how the heart works for people to listen to in the car.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.
- Evaluate students on assignment sheet activities if not previously completed.
- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approach for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Introducing Biology*, a Telecourse, The coast Community colleges, Orange County, CA, 1985.
- Nurse's Book Society, 3000 Cindel Drive, Delran, NJ, 08075-9907.

  Erickson, Barbara, *Heart Sounds and Murmurs: A Practical Guide.* Includes both text and tape for identifying and interpreting abnormal heart sounds.

  Normal and Abnormal Heart Sounds. Audio tape of normal and abnormal heart sounds.

  Tilkian, Ara G. and Mary Boudreau Conover, *Understanding Heart Sounds and Murmurs: With an Introduction to Lung Sounds*, Manual and accompanying 60 minute tape.

- *Prevention and Treatment of heart Disease,* Health Edco, P.O. Box 21207, Waco, TX 76702-1207, 1-800-299-3366, fax 1-817-751-0221.Health Edco, P.O. Box 21207, Waco, TX 76702-1207, 1-800-299-3366, fax 1-817-751-0221. Covers preventable and treatable heart diseases; connection between heart condition and lifestyle. (Slides, filmstrip, or VHS)
- Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8102, Mansfield, OH 44901-8103, 419-589-1700.

  Anatomy and Physiology Filmstrip Series; *Cardiovascular system*, Unit 7. Includes filmstrip and cassette.

  Cardiovascular Fitness Video. Discusses importance of proper levels of stress and exercise. (VHS)

  Human Systems Filmstrip Set; *Circulation in the Human Body.* Filmstrip and manual, covers pathways of circulation.

- Oklahoma Department of Vocational and Technical Education, 1500 West Seventh Avenue, Stillwater, Oklahoma, 74074. The following are available to Oklahoma teachers on a free loan basis.

  Circulatory System. 2nd Ed., 1980. Covers heart chambers, blood elements, and circulatory system. (VHS 1/2", color, 16 minutes)

  Your Active Body Series: Heart and Circulation. Covers blood flow, the functions of the heart, and blood elements. (1/2" color VHS, 10 minutes)

Software

- *Crossword Magic*, L & S Computerware, Mindscape, Inc., 3444 Dundee Road, North Brook, IL.

- Opportunities for Learning, 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 419-587-1700.

  Cardiac Muscle Mechanics A Tool for Teachers. Physiological Simulation and Lecture Slides, computer software. Covers contractions, force, length, and time. Includes slides and manual. Requires color graphics adapter card and monitor. For use on IBM, 256 K.

  Heart Simulator. Uses graphics to depict heart functions. Includes lesson planner, educational objectives, program sequence, and scoring criteria. For use on Apple computers, 48K.

  Heart Software. Includes five units on the heart, covering the heart's location, chambers, valves, arteries, veins, and blood flow. Also includes glossary, unit review quizzes, and courseware guide. For use on Apple computers, 64K.

Print Media

- Fong, Elizabeth, Elvira B. Ferris, and Esther G. Skelley. *Body Structures and Functions*, 7th ed., Delmar Publishers, Inc., Albany, New York, 1989.

- Slide set to accompany *Human Anatomy and Physiology* by John Hole, 4th ed., Wm C. Brown Publishers, Dubuque, Iowa, 1987.

- Huang, Sheila, *Coronary Care Nursing*. Diagnostic and treatment information.

- Sloan, Kathleen, Kathryn Persson, and S. Kathleen Moore. *Mosby's Anatomy and Physiology Laboratory manual*, C.V. Mosby Co., St. Louis, 1990.

Tilkian, Ara G. and Mary Boudreau Conover, *Understanding Heart Sounds and Murmurs: With an Introduction to Lung Sounds*, Manual and accompanying 60 minute tape.

- Tilkian, Ara G. and Elaine Kiess Daily, *Cardiovascular Procedures: Diagnostic Techniques and Therapeutic Procedures*, Nurse's Book Society, 3000 Cindel Drive, Delran, NJ, 08075-9907. Includes step-by-step descriptions of cardiovascular procedures with illustrations.

NOTE: The American Heart Association publishes literature on promoting the health functioning of the heart.

UNIT REFERENCES

- Anthony, Catherine P. and Gary A. Thibodeau. *Textbook of Anatomy and Physiology*, 11th ed., C.V. Mosby Col, St. Louis, 1983.
- Hole, John W. *Human Anatomy and Physiology*, 4th ed., Wm C. Brown Publishers, Dubuque, Iowa, 1987.
- Tortora, Gerald J. and Nicholas P. Anagnostakos. *Principles of Anatomy and Physiology*, 3rd ed., Harper & Row Publishers, New York, 1981.

INFORMATION SHEET

THE HEART *IX*

OBJECTIVE 1

Match terms associated with the heart to their definitions.

- **atrioventricular (A-V) node** – the mass of specialized muscle fibers in the septum at the junction of the four chambers
- **Bundle of His** – a small band of cardiac muscle fibers responsible for conducting nerve impulses
- **cardiac** – pertaining to the heart
- **cusp** – the flap of valves that open and close
- **diastole** – the period of time when the heart rests between contractions
- **septum** – the wall in the middle of the heart that divides it into right and left sides
- **sinoatrial (S-A) node** – the small mass of specialized muscle fibers in the posterior wall of the right atrium just below the opening of the superior vena cava that establishes the rhythm of cardiac contractions

  NOTE: The S-A node is know as "the pacemaker of the heart."

- **systole** – the period of time when the heart contracts
- **valve** – a membranous structure that temporarily closes a heart passageway to permit flow of blood in one direction only.

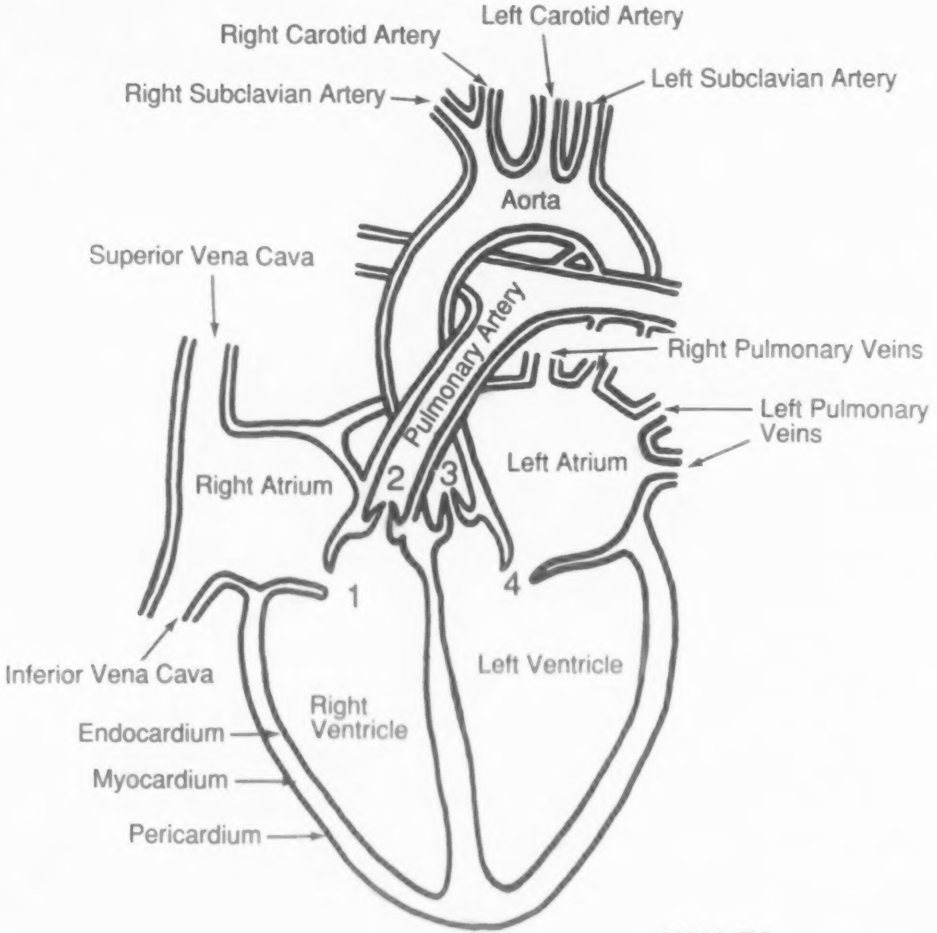
OBJECTIVE 2

State function of the heart.

By pumping blood into the arteries, the heart:

- Delivers nutrients and oxygen to all body cells
- Transports waste products to the excretory organs
- Distributes hormones and antibodies to the tissues where needed

OBJECTIVE 3 | **Label structures of the heart.**


Right Carotid Artery
Left Carotid Artery
Right Subclavian Artery
Left Subclavian Artery
Aorta
Superior Vena Cava
Pulmonary Artery
Right Pulmonary Veins
Left Pulmonary Veins
Right Atrium
Left Atrium
2
3
1
4
Inferior Vena Cava
Left Ventricle
Right Ventricle
Endocardium
Myocardium
Pericardium

VALVES
1. Tricuspid
2. Pulmonary Semilunar
3. Aortic Semilunar
4. Bicuspid or Mitral

474

OBJECTIVE 4 **Match structures of the heart to their descriptions.**

Layers of the heart wall

- **endocardium** – the very smooth layer of cells that lines the inside of the heart and forms the valves
- **myocardium** – the middle and thickest layer; the muscle layer
- **pericardium** – the double membrane that covers the heart and secretes fluid that provides lubrication to prevent friction during heart action

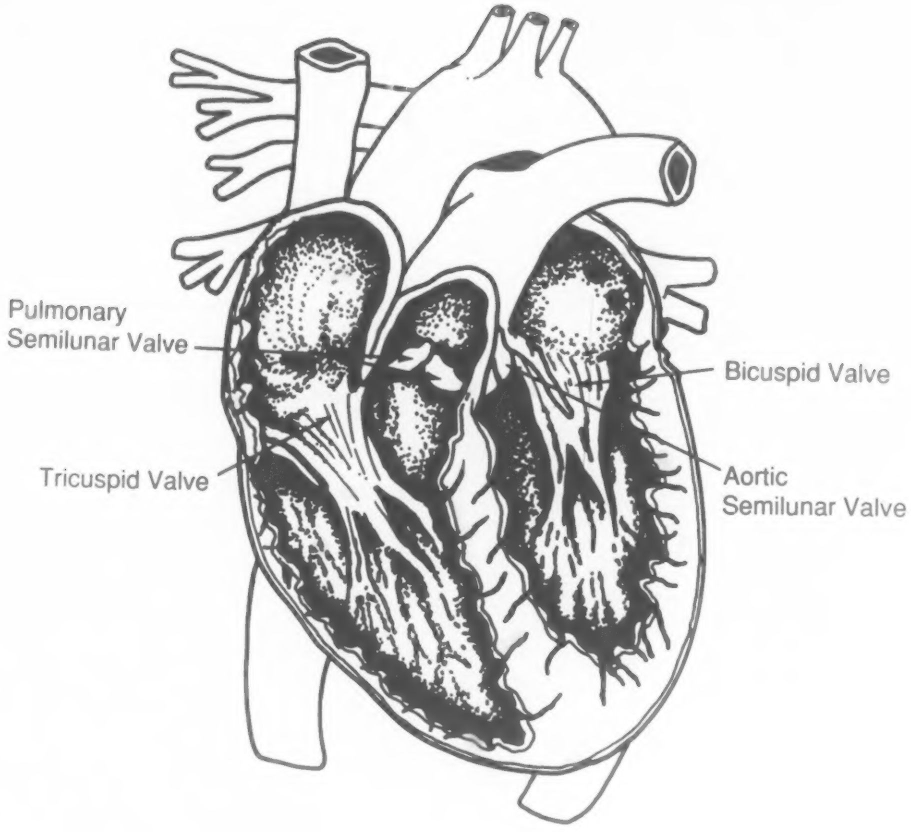
Chambers of the heart

- **right atrium** – thin-walled space that receives deoxygenated venous blood as it returns from the body
- **right ventricle** – thicker-walled space that receives blood from the right atrium and pumps it into the lungs
- **left atrium** – space that receives oxygenated blood from the lungs
- **left ventricle** – thickest-walled space of the heart; receives blood from the left atrium and pumps it to the rest of the body through the arteries

  NOTE: The right and left sides of the heart are separated by the septum.

Valves

- **tricuspid** – closes to prevent any blood from flowing back into the right atrium when the right ventricle begins to pump
- **pulmonary semilunar** – between the right ventricle and the pulmonary artery leading to the lungs; prevents blood from returning to the right ventricle
- **bicuspid or mitral** – closes to prevent blood from returning to the left atrium when the left ventricle begins to contract
- **aortic semilunar** – between the left ventricle and the aorta; prevents blood from returning to the left ventricle


Pulmonary Semilunar Valve
Bicuspid Valve
Tricuspid Valve
Aortic Semilunar Valve

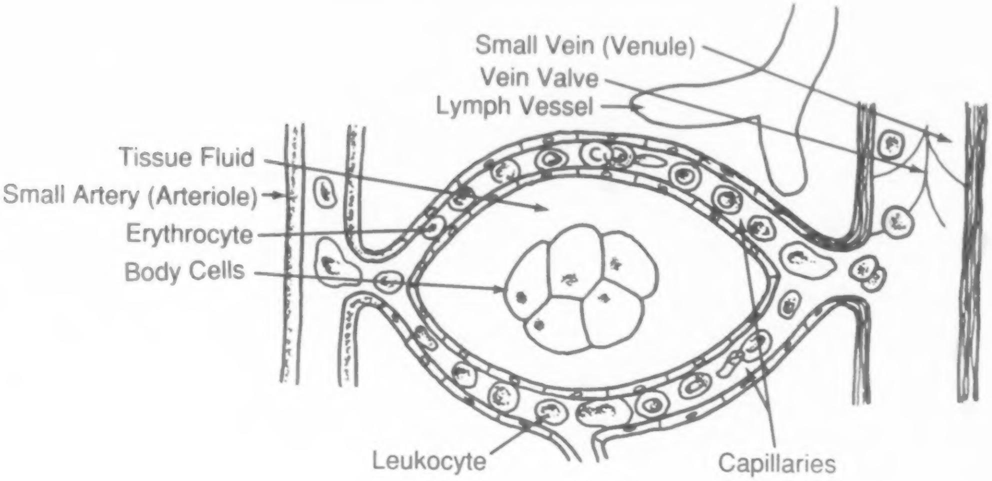
OBJECTIVE 5 **Distinguish among blood vessels.**

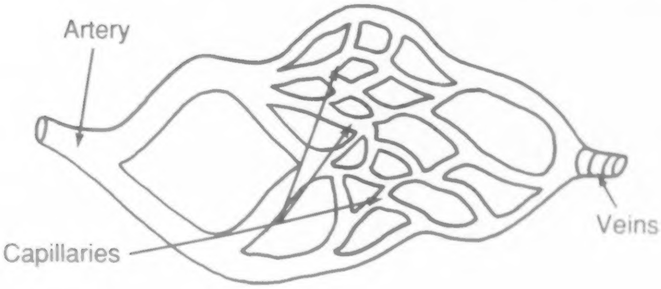
Arteries

- Thickest-walled blood vessels
- Carry blood from the pumping chambers (ventricles) to the organs

Capillaries

- Small, thin-walled vessels linking arteries and veins
- Nutrients and oxygen pass through capillary walls into tissues; waste products and deoxygenated blood cells enter through capillary walls for transport back to the heart


Small Vein (Venule)
Vein Valve
Lymph Vessel
Tissue Fluid
Small Artery (Arteriole)
Erythrocyte
Body Cells
Leukocyte
Capillaries


Artery
Capillaries
Veins

477

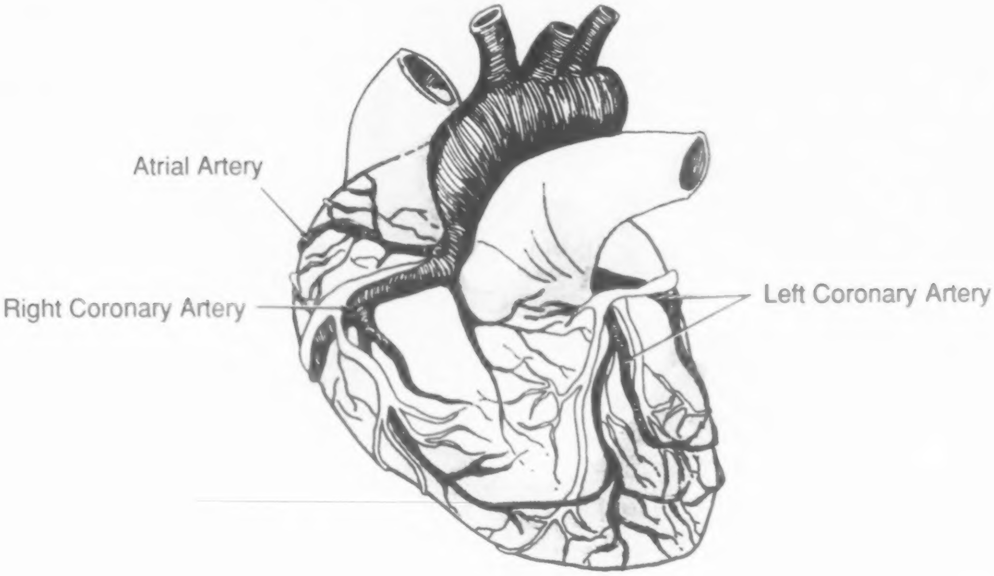
Veins

- Larger than capillaries, but thinner-walled than arteries
- Transport blood back to the heart under low pressure

OBJECTIVE 6 **Select from a list true statements about the blood supply to the heart.**

- The heart does not draw nutrients from the blood as it passes through the chambers of the heart and must have its own circulatory pathway for nourishment.
- The coronary arteries branch off the aorta just above the aortic semilunar valve and supply blood to the muscles of the heart.
- The left branch supplies blood to the left atrium and ventricle; the right branch supplies blood to the right side of the heart.
- Coronary arteries become smaller as they enter the heart wall and nourish the tissue through capillaries. They then drain into venules and coronary veins that carry blood to the right atrium.

  NOTE: The arteries that supply heart muscles fit around the top of the heart like a crown, so they are called "coronary."



(Coronary arteries surround the heart)

478

OBJECTIVE 7 **Choose the word or phrase that completes statements about the physiology of the heart.**

The Cardiac Cycle

1. The atria contract while the ventricles relax and fill with blood.
2. The ventricles contract and force blood into circulation while the atria relax and fill with blood.

NOTE: The period of contraction is known as the systole and the period of relaxation is known as the diastole.

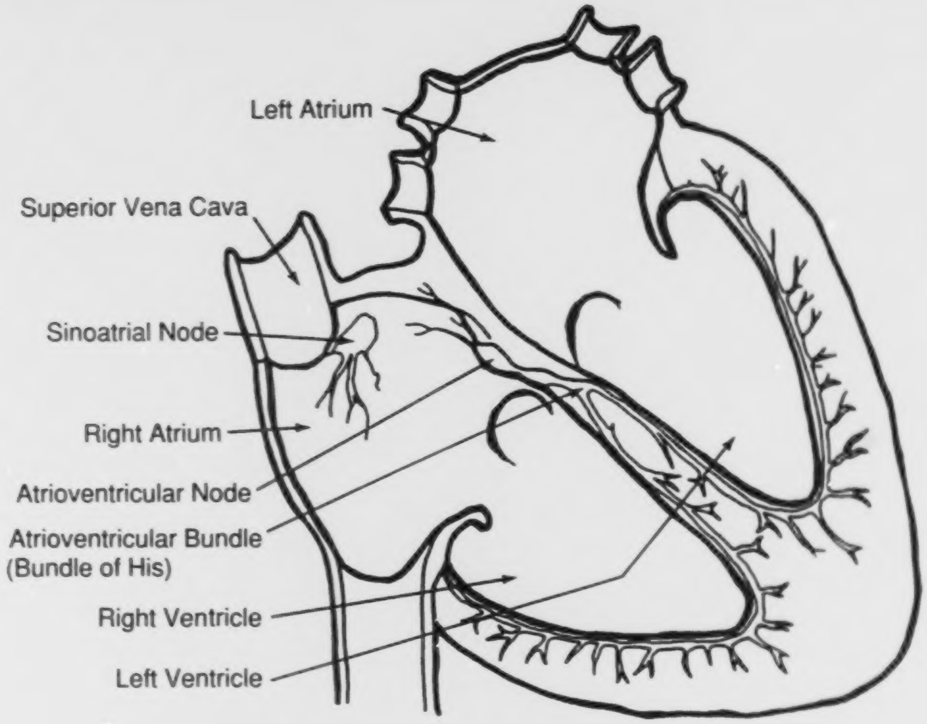
Nerve Control

- The nerve control originates in the S-A node.
- The heart contracts rhythmically even though its outside nerve supply may be interrupted or destroyed.
- Nerve supply comes from part of the autonomic nervous system, which increases or decreases the heart rate.

Conduction System

NOTE: The nerve conduction system is a combination of nerves and muscle tissue that regulates contractions.

1. Contraction begins in the S-A node, then travels as the wave passes through the atrial muscles, causing them to contract.
2. The A-V node is stimulated and transmits the waves to the Bundle of His, which stimulates the ventricular muscles, causing them to contract.


Left Atrium
Superior Vena Cava
Sinoatrial Node
Right Atrium
Atrioventricular Node
Atrioventricular Bundle (Bundle of His)
Right Ventricle
Left Ventricle

Heart sounds and murmurs

- The heart sounds are produced as a result of the beating activities of the heart. Two sounds, lubb and dupp, are produced.
- The first sound is systolic (lubb) and is due to the cuspid valve closure and ventricle contractions.
- The second sound is diastolic (dupp) and is due to the closure of the semilunar valves.
- Additional sounds associated with abnormal closure of the valves are called murmurs.

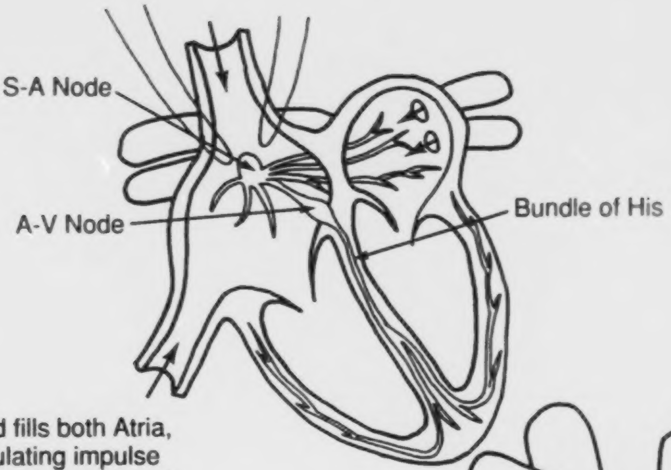
OBJECTIVE 8 **Arrange in order steps in the flow of blood through the heart.**

1. Blood flows through the superior and inferior vena cava into the right atrium of the heart.
2. Blood then flows through the tricuspid valve and into the right ventricle.
3. From the right ventricle, blood flows through the pulmonary valve, into the pulmonary artery, and into the lungs.

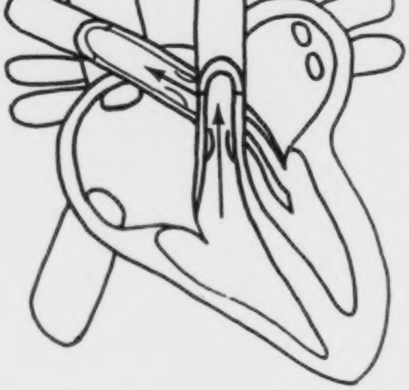
4. Blood returns to the heart from the lungs by flowing through the pulmonary veins into the left atrium.

5. Blood flows from the left atrium, through the mitral valve, and into the left ventricle.

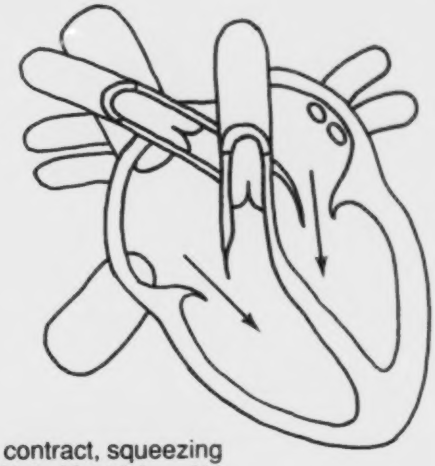
6. Blood is then pumped through the aortic valve, into the aorta, and then flows to general arterial circulation.



1. Blood fills both Atria, stimulating impulse in SA node - Diastole

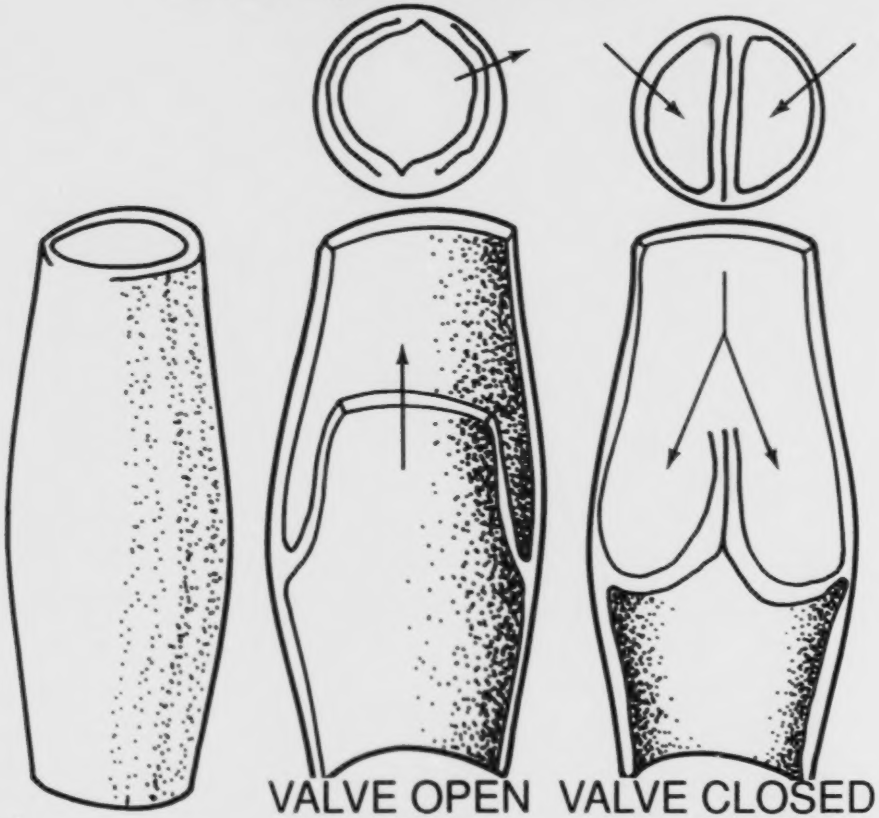


3. Ventricles contract, Squeezing blood into Aorta and Pulmonary Arteries - Systole



2. Atria contract, squeezing blood into Ventricles. AV node is stimulated, transmitting impulse to Bundle of His

Bicuspid Valves

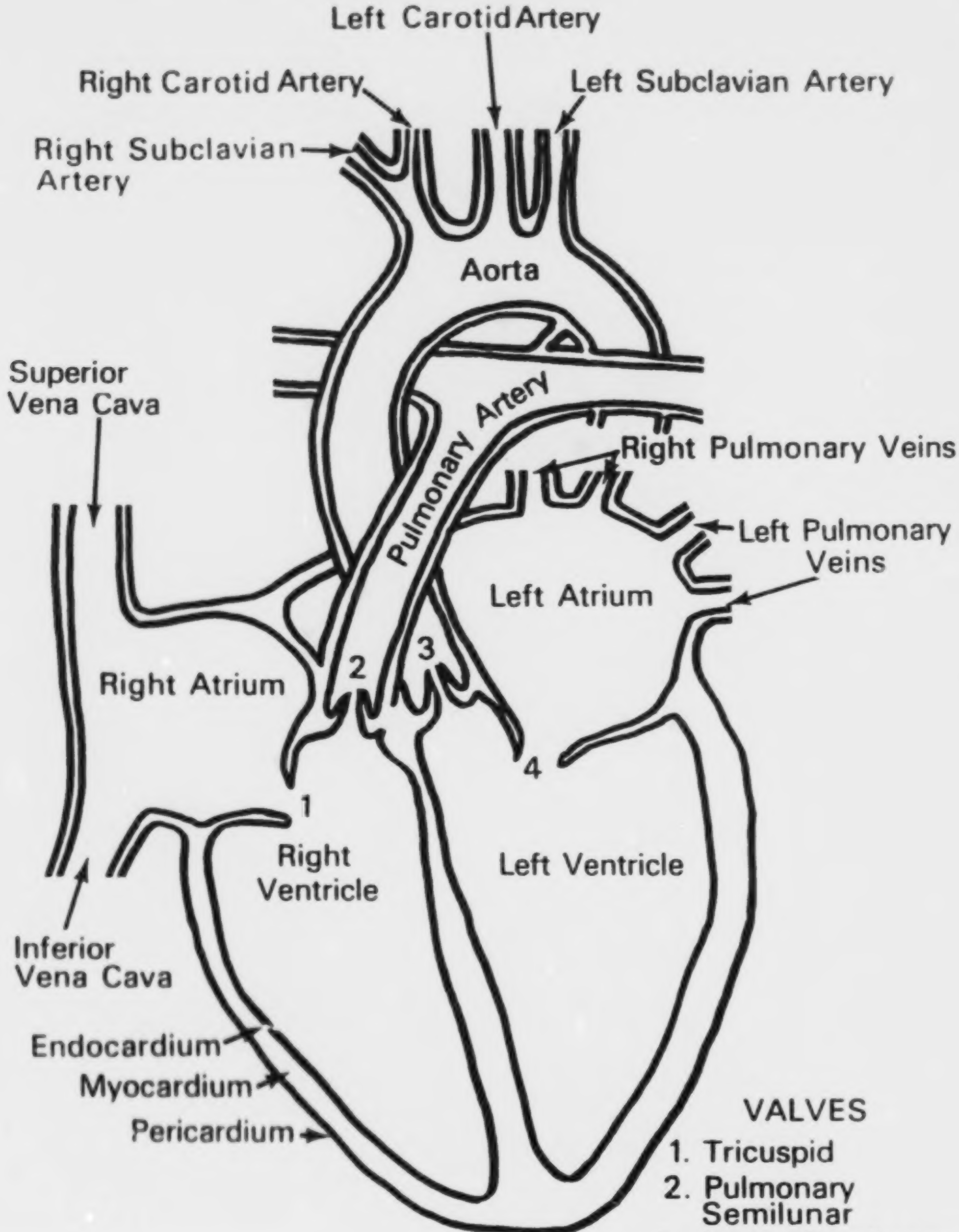

VALVE OPEN
Lateral View
VALVE CLOSED
Medial View

Veins contain bicuspid valves which open in the direction of the blood flow, but prevent backward flow when pockets become filled.

484

483

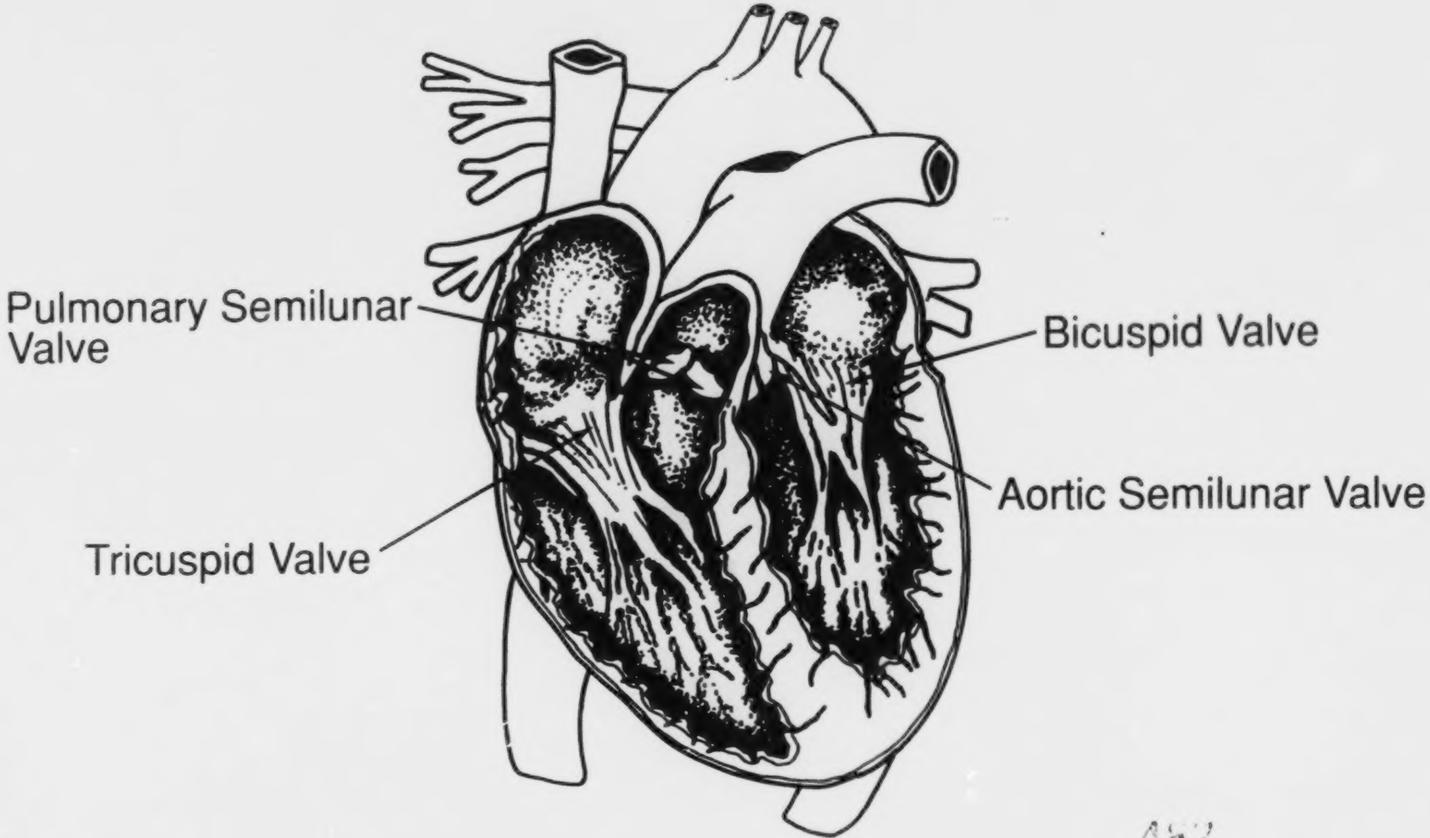
Structure of the Heart


Left Carotid Artery
Right Carotid Artery
Left Subclavian Artery
Right Subclavian Artery
Aorta
Superior Vena Cava
Pulmonary Artery
Right Pulmonary Veins
Left Pulmonary Veins
Left Atrium
Right Atrium
2
3
4
1
Right Ventricle
Left Ventricle
Inferior Vena Cava
Endocardium
Myocardium
Pericardium

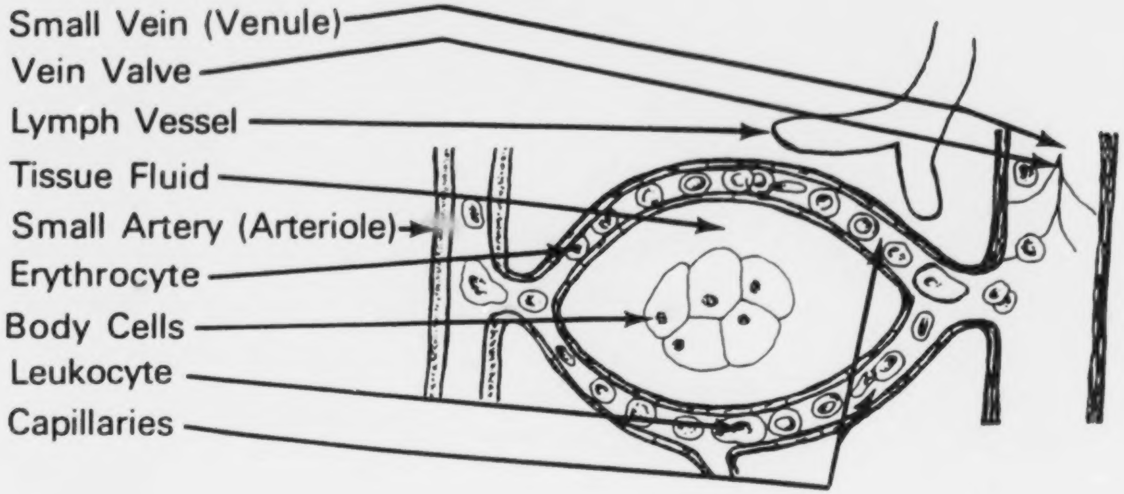
VALVES

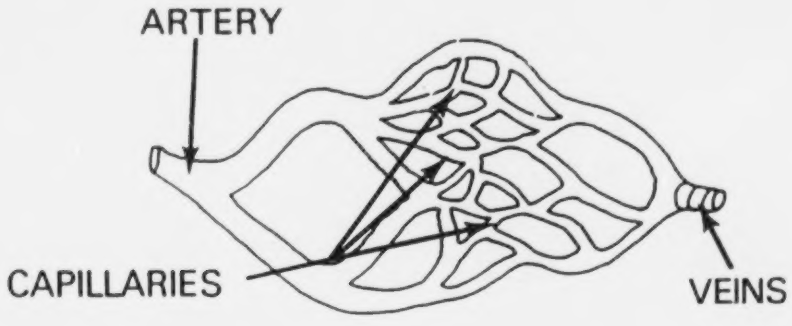
1. Tricuspid
2. Pulmonary Semilunar
3. Aortic Semilunar
4. Bicuspid or Mitral

Coronary Valves


Pulmonary Semilunar Valve
Bicuspid Valve
Aortic Semilunar Valve
Tricuspid Valve

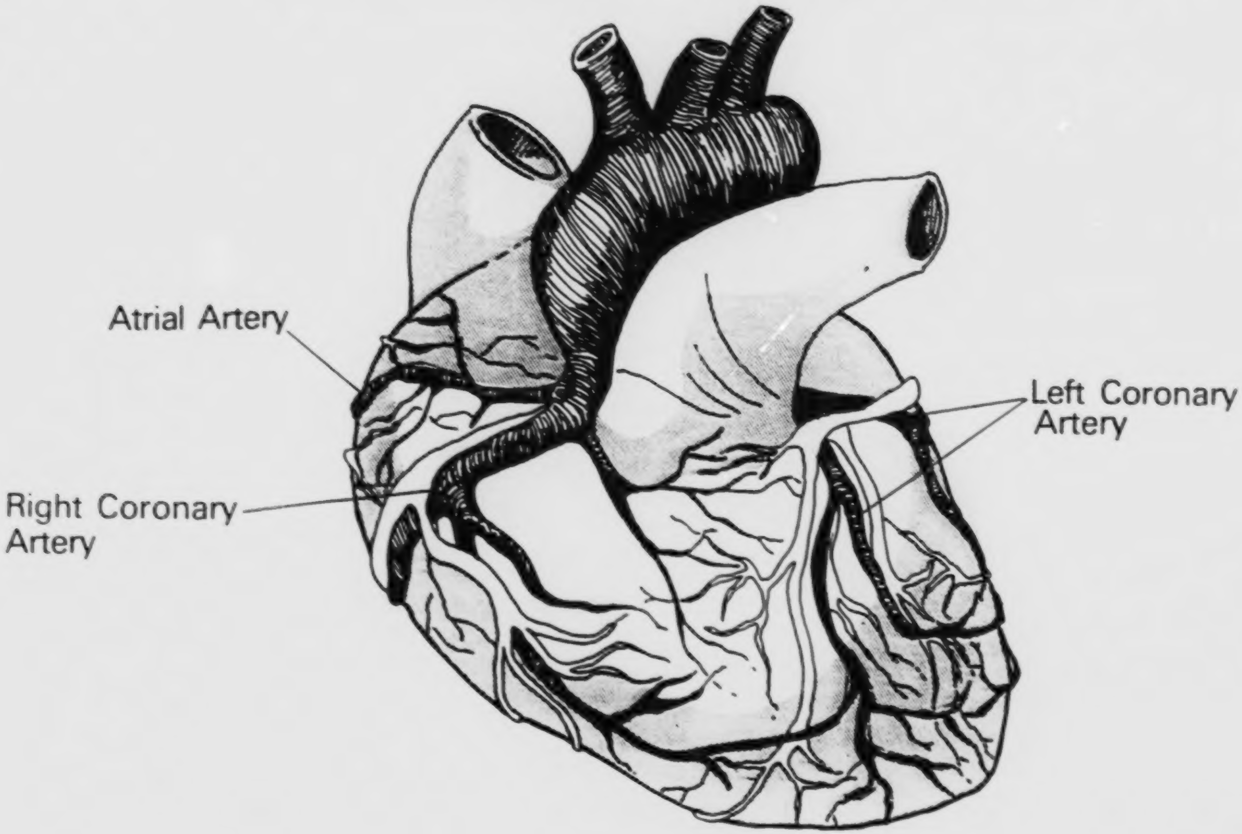
Capillary Function


Small Vein (Venule)
Vein Valve
Lymph Vessel
Tissue Fluid
Small Artery (Arteriole)
Erythrocyte
Body Cells
Leukocyte
Capillaries


ARTERY
CAPILLARIES
VEINS

TRANSPARENCY MASTER 4 Body Structure and Function
CIMC · IX · 27

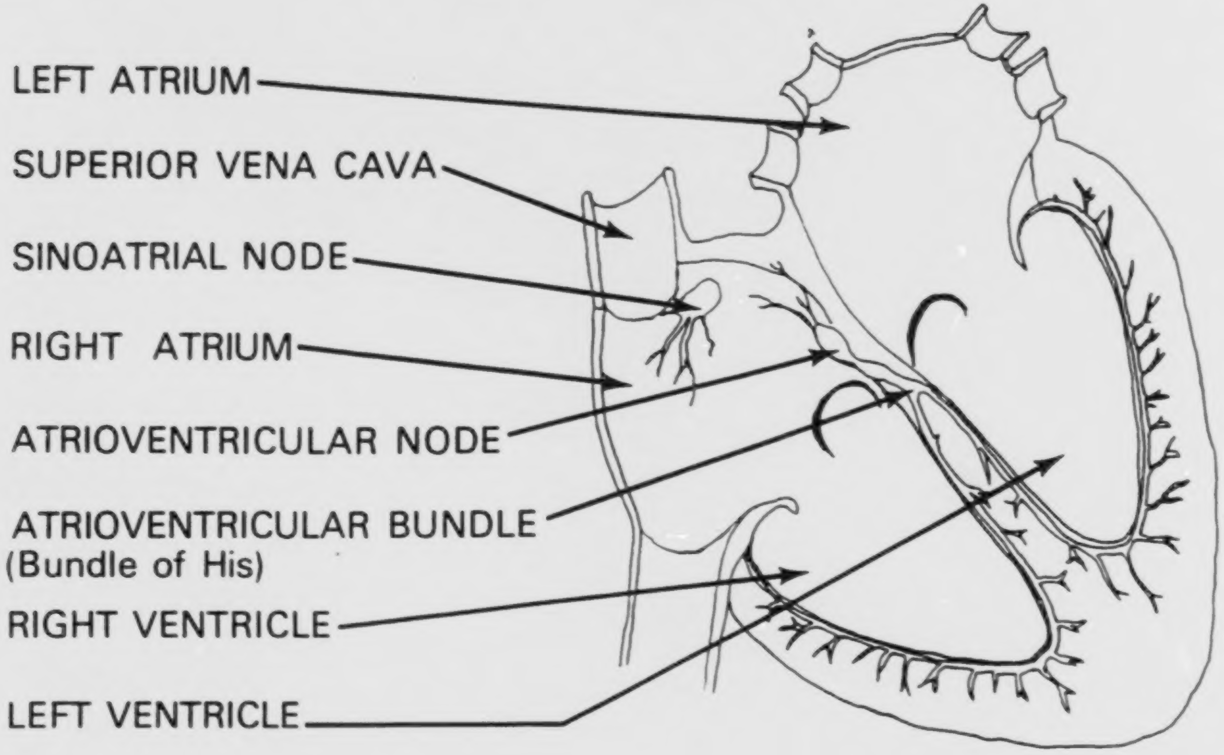
Blood Supply to the Heart


Atrial Artery
Left Coronary Artery
Right Coronary Artery

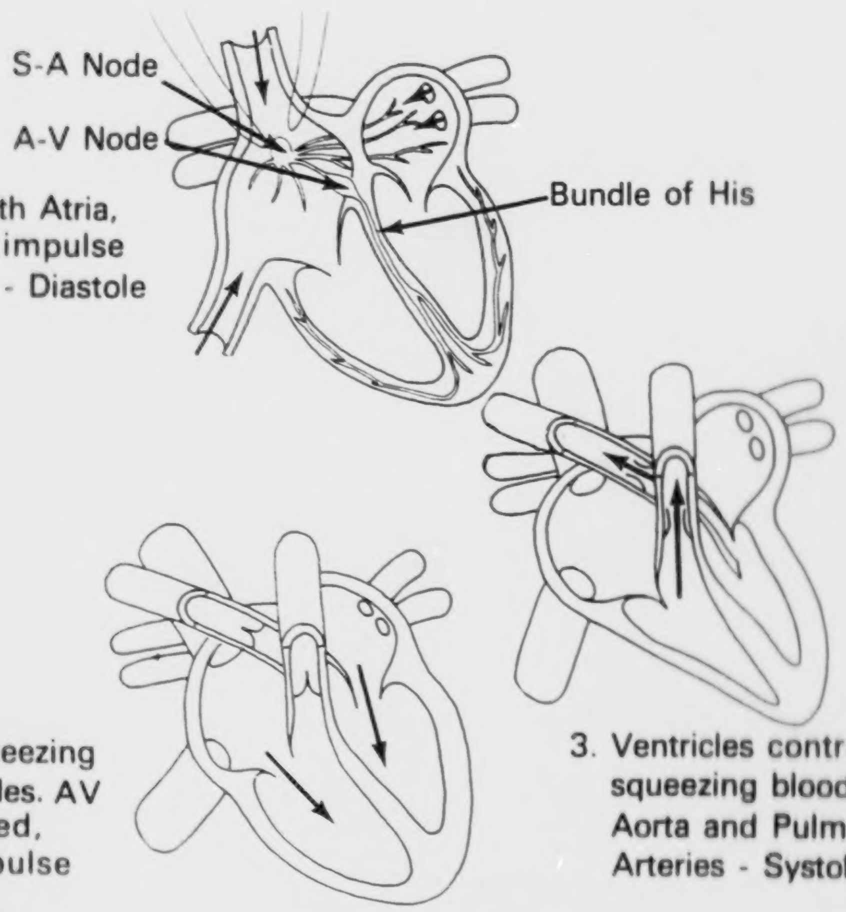
(Coronary arteries surround the heart)

TRANSPARENCY MASTER 6 · Body Structure and Function
CIMC IX 31

Conduction System of the Heart


LEFT ATRIUM
SUPERIOR VENA CAVA
SINOATRIAL NODE
RIGHT ATRIUM
ATRIOVENTRICULAR NODE
ATRIOVENTRICULAR BUNDLE (Bundle of His)
RIGHT VENTRICLE
LEFT VENTRICLE

The Heart Pumping Cycle



1. Blood fills both Atria, stimulating impulse in SA node - Diastole

2. Atria contract, squeezing blood into Ventricles. AV node is stimulated, transmitting impulse to Bundle of His

3. Ventricles contract, squeezing blood into Aorta and Pulmonary Arteries - Systole

TRANSPARENCY MASTER 7 · Body Structure and Function
CIMC · IX · 33

TM 7

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization

  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language

  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing self confidence/esteem

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

- As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

- Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

- Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

- Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

• If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:
  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.
  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.
- If students have difficulty adapting their presentation to a specific audience:
  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.
  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.
- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

- If students have difficulty developing self confidence/esteem:
  - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.
  - Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.
  - Allow the students to work in heterogenous groups to enable the less confident students to learn from the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE HEART

IX

Name ______________________________ Score ____________

OBJECTIVE 9

Communicate about how the heart works.

INTRODUCTION

Heart disease is one of the primary causes of death or serious illness in the United States. Yet there are many measures which can help prevent a heart attack. To understand, practice, and discuss these measures, health care professionals must understand how the health heart works. This will help them educate others in the ways of keeping a healthy heart.

DIRECTIONS

Create a model, poster, pamphlet, brochure, oral report, skit, or cartoon on the heart and how it works. Present the project to the class.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (written and oral)

Job Acquisition/ Development Skills
- Develop self confidence/esteem

500

THE HEART

ASSIGNMENT SHEET

Scores should reflect the amount of research and practical information presented. Information should be current and correct and should be presented according to HOSA guidelines.

WRITTEN TEST

THE HEART

IX

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with the heart to their definitions. Write the correct letter in the blank.

_____ 1. A membranous structure that temporarily closes a heart passageway to permit flow of blood in one direction only

_____ 2. The small mass of specialized muscle fibers in the posterior wall of the right atrium just below the opening of the superior vena cava that establishes the rhythm of cardiac contractions

_____ 3. A small band of cardiac muscle fibers responsible for conducting nerve impulses

_____ 4. The flap of valves that open and close

_____ 5. The mass of specialized muscle fibers in the septum at the junction of the four chambers

_____ 6. The period of time when the heart contracts

_____ 7. The wall in middle of the heart that divides it into right and left sides

_____ 8. The period of time when the heart rests between contractions

_____ 9. Pertaining to the heart

a. atrioventricular (A-V) node

b. Bundle of His

c. cardiac

d. cusp

e. diastole

f. endocardium

g. myocardium

h. pulmonary semilunar

i. septum

j. sinoatrial (S-A) node

k. subclavian

l. systole

m. valve

May be photocopied for student use.

OBJECTIVE 2 | **State functions of the heart.**

1. ____

____

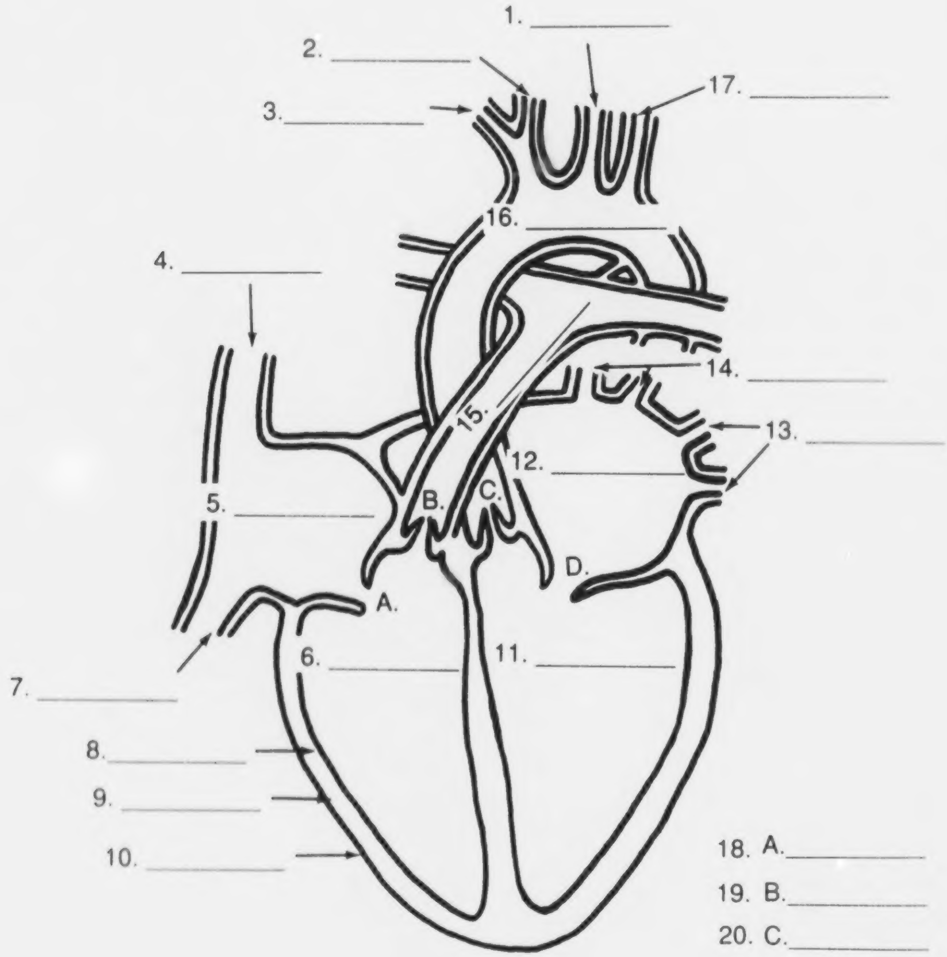
2. ____

____

3. ____

____

OBJECTIVE 3 | **Label structures of the heart.**


1. ____________
2. ____________
3. ____________
17. ____________
16. ____________
4. ____________
14. ____________
15.
13. ____________
12. ____________
5. ____________
B.
C.
D.
A.
6. ____________
11. ____________
7. ____________
8. ____________
9. ____________
10. ____________

18. A.____________

19. B.____________

20. C.____________

21. D.____________

May be photocopied for student use.

OBJECTIVE 4

Match structures of the heart to their descriptions. Write the correct letter in the blank.

Part I

_____ 1. Between the right ventricle and the pulmonary artery leading to the lungs; prevents blood from returning to the right ventricle

_____ 2. The middle and thickest layer; the muscle layer

_____ 3. Between the left ventricle and the aorta; prevents blood from returning to the left ventricle

_____ 4. Thin-walled space that receives deoxygenated venous blood as it returns from the body

_____ 5. Closes to prevent blood from returning to the left atrium when the left ventricle begins to contract

_____ 6. Closes to prevent any blood from flowing back into the right atrium when the right ventricle begins to pump

a. aortic semilunar

b. bicuspid or mitral

c. endocardium

d. left ventricle

e. myocardium

f. pericardium

g. pulmonary semilunar

h. right atrium

i. tricuspid

May be photocopied for student use

Part II

_____ 1. Space that receives oxygenated blood from the lungs

_____ 2. Thicker-walled space that receives blood from the right atrium and pumps it into the lungs

_____ 3. Thickest-walled space of the heart; receives blood from the left atrium and pumps it to the rest of the body through the arteries

_____ 4. The double membrane that covers the heart and secretes fluid that provides lubrication to prevent friction during heart action

_____ 5. The very smooth layer of cells that lines the inside of the heart and forms the valves

a. aortic semilunar
b. endocardium
c. left atrium
d. left ventricle
e. mitral or bicuspid
f. pericardium
g. right atrium
h. right ventricle

OBJECTIVE 5

Distinguish among blood vessels. Write an "A" in the blank before statements about arteries; a "V" before statements about veins; and a "C" before statements about capillaries.

_____ 1. Nutrients and oxygen pass through vessel walls into tissues; waste products and deoxygenated blood cells enter through walls for transport back to the heart

_____ 2. Carries blood from the pumping chambers to the organs

_____ 3. Thickest-walled blood vessels

_____ 4. Transports blood back to the heart under low pressure

_____ 5. Small, thin-walled vessels linking arteries and veins

May be photocopied for student use.

OBJECTIVE 6 **Select from a list true statements about the blood supply to the heart.** Write an "X" in the blanks before true statements.

_____ 1. The coronary arteries branch off the aorta just above the aortic semilunar valve and supply blood to the muscles of the heart.

_____ 2. Coronary arteries and veins widen as they meet the heart wall and join the circulatory system arteries and veins.

_____ 3. The heart does not draw nutrients from the blood as it passes through the chambers of the heart and must have its own circulatory pathway for nourishment.

_____ 4. The left branch supplies blood to the left and right atrium and the septum; the right branch supplies blood to the left and right ventricles.

_____ 5. The heart absorbs most if its nutrients from blood passing through chambers of the heart.

_____ 6. The left branch supplies blood to the left atrium and ventricle; the right branch supplies blood to the right side of the heart.

_____ 7. Muscles of the heart receive the oxygen they need directly from the lungs.

_____ 8. Coronary arteries become smaller as they enter the heart wall and nourish the tissue through capillaries.

_____ 9. Veins and arteries in the heart supply specialized nutrients and enzymes to regulate heart action.

_____ 10. Coronary arteries drain into venules and coronary veins that carry blood to the right atrium.

May be photocopied for student use.

OBJECTIVE 7 **Choose the word or phrase that completes statements about the physiology of the heart.** Write the correct letter in the blank.

_____ 1. The atria contract while the ventricles relax and fill with blood. Then, the ventricles contract while the atria

a. force air into the ventricles
b. sends nerve messages to the brain
c. relax and fill with blood
d. empty

_____ 2. The nerve control originates in the

a. S-A node
b. right atrium
c. tricuspid valve
d. central nervous system

_____ 3. A contraction begins in the S-A node, then travels as the wave passes through the atrial muscles, causing them to

a. swell
b. contract
c. activate
d. release

_____ 4. The two sounds produced as a result of the beating activities of the heart are called

a. lubb and dupp
b. lupp and dapp
c. lapp and dubb
d. lapp and dapp

_____ 5. The diastolic sound is due to the

a. opening of the bicuspid valve
b. opening of the tricuspid valves
c. rush of blood through the right atrium
d. closure of the semilunar valves

May be photocopied for student use.

_____ 6. The A-V node is stimulated and transmits the waves to the Bundle of His, which stimulates the ventricular muscles, causing them to

a. expand
b. vibrate
c. contract
d. release

_____ 7. The heart contracts rhythmically even though its outside nerve supply may be

a. activated
b. interrupted or destroyed
c. irregular
d. overstimulated

_____ 8. The ventricles contract and force blood into circulation while the atria relax and

a. empty
b. absorb blood from surrounding tissue
c. fill with blood
d. remain in stasis

_____ 9. The systolic sound is due to ventricle contractions and the closure of the

a. Bundle of His
b. superior vena cava
c. inferior vena cava
d. cuspid valve

_____ 10. Nerve supply comes from part of the autonomic nervous system which

a. increases or decreases the heart rate
b. charges and discharges the heart
c. recognizes and reacts to the heartbeat
d. activates and releases electrical charges

May be photocopied for student use.

OBJECTIVE 8 **Arrange in order steps in the flow of blood through the heart.** Write a "1" in the blank before the first step, a "2" in the blank before the second, etc.

1. Blood is then pumped through the aortic valve, into the aorta, and then flows to general arterial circulation.
2. Blood returns to the heart from the lungs by flowing through the pulmonary veins into the left atrium.
3. From the right ventricle, blood flows through the pulmonary valve, into the pulmonary artery, and into the lungs.
4. Blood flows through the superior and inferior vena cava into the right atrium of the heart.
5. Blood then flows through the tricuspid valve and into the right ventricle.
6. Blood flows from the left atrium, through the mitral valve, and into the left ventricle.

NOTE: Objective 9 is evaluated on the job sheet/assignment sheet in this unit. If you have not completed these components, see your instructor.

509

May be photocopied for student use

WRITTEN TEST ANSWERS

THE HEART

IX

OBJECTIVE 1

1. m
2. j
3. b
4. d
5. a
6. l
7. i
8. e
9. c

OBJECTIVE 2

List must include:

- Delivers nutrients and oxygen to all body cells
- Transports waste products to the excretory organs
- Distributes hormones and antibodies to the tissues where needed

OBJECTIVE 3

1. Left carotid artery
2. Right carotid artery
3. Right Subclavian artery
4. Superior Vena Cava
5. Right Atrium
6. Right Ventricle
7. Inferior Vena Cava
8. Endocardium
9. Myocardium
10. Pericardium
11. Left Ventricle
12. Left Atrium
13. Left Pulmonary Veins
14. Right Pulmonary Veins
15. Pulmonary Artery
16. Aorta
17. Left Subclavian Artery
18. Tricuspid
19. Pulmonary Semilunar
20. Aortic Semilunar
21. Bicuspid or Mitral

OBJECTIVE 4

Part 1		Part 2	
1.	g	1.	c
2.	e	2.	h
3.	a	3.	d
4.	h	4.	f
5.	d	5.	b
6.	i		

OBJECTIVE 5

1.	C
2.	A
3.	A
4.	V
5.	C

OBJECTIVE 6 1, 3, 6, 8, 10

OBJECTIVE 7

1.	c	6.	c
2.	a	7.	b
3.	b	8.	c
4.	a	9.	d
5.	d	10.	a

OBJECTIVE 8

1.	6	6.	5
2.	4		
3.	3		
4.	1		
5.	2		

511

OBJECTIVE SHEET

THE CIRCULATORY SYSTEM

X

INTRODUCTION

Few body systems receive more attention than the circulatory system. Jogging, aerobic exercise, low-fat, low-salt, low-cholesterol diets, and stress reduction workshops are all responses to popular circulatory system concerns. In research, pacemakers, valve replacements, artificial hearts, and heart replacements make headlines. As America's population continues to age, this interest will grow.

UNIT OBJECTIVE

After completing this unit the student will be able to identify the components and functions of the heart and other circulatory system structures, the lymphatic system, and the spleen. The student will demonstrate these competencies by completing an assignment sheet and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the circulatory system to their definitions.
2. Select from a list functions of the circulatory system.
3. Choose the word or phrase that completes statements about blood pressure and heart rate.
4. Distinguish among structures of the blood vessels.
5. Arrange in order steps in the process of blood circulations.
6. Label the principal arteries and veins.
7. Label the cranial vessels.
8. Arrange in order steps in the process of portal circulation.
9. Label the lymph nodes.
10. Choose the word or phrase that completes statements about the lymphatic system.
11. Select from a list functions of the spleen.
12. Communicate about how the circulatory system works. (Assignment Sheet)

THE CIRCULATORY SYSTEM

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Order materials to supplement the unit. Three dimensional models may be obtained from Health Edco, P. O. Box 21207, Waco, TX 76702-1207, 800-299-3366, fax 817-751-0221.
- Invite a heart specialist to discuss the functions of the circulatory system.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. You may want to supply the Objective Sheet, Information Sheet and any other components you want covered. Confirm the scheduled appearance 2-3 days prior to the presentation.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.
  - Assist students in scheduling and presenting prepared and extemporaneous speeches.

  - Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.

  - Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.

  - Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the circulatory system to their definitions.

- Have students locate terms on transparency masters.

- Have students group similar terms such as pericardium, endocardium, and myocardium.

- Review terms presented in other units that will be used in discussion during this unit.

Objective 2: Select from a list functions of the circulatory system.

- Have students compare functions of the blood and circulatory systems.

- Have students list traits associated with the circulatory system such as love, passion (hot-blooded), aloofness (cold-hearted), etc. Have students brainstorm about why the circulatory system is the focus of so many associations.

Objective 3: Choose the word or phrase that completes statements about blood pressure and heart rate.

- Students will probably be somewhat familiar with blood pressure and heart rate. Have them discuss how they became familiar with the terms, what they really know about them, and what the average person knows about them.

- Have students discuss ways their blood pressure and heart rate have been measured, including doctor's offices, machines in grocery and department stores, in gyms or exercise clubs, or at school. Remind them that blood pressure and heart rate are often measured when resting as well as during and after exercise.

- Show students how take blood pressure and heart rate readings and record them.

Objective 4: Distinguish among structures of the blood vessels.

- If possible, present samples or diagrams showing all types of vessels and allow students to compare their appearances and locations.
- Have students locate veins and arteries under the skin on their forearms.

Objective 5: Arrange in order steps in the process of blood circulation.

- Demonstrate the process of blood circulation, using transparency masters provided or other media. Present a variety of diagrams.
- Allow students to view a model of a heart and identify circulatory paths.
- If available, give students a beef or lamb heart and have them identify cavities and major landmarks.
- Have students compare blood vessels to everyday items such as drinking straws. Have them identify similarities and differences.
- Have students complete Activity Sheets 1 and 2.

  NOTE: Extensions & Options 1 and 2 are provided as an optional tool for Activity Sheet 2.

Objective 6: Label the principal arteries and veins.

Objective 7: Label the cranial vessels.

- Present a variety of diagrams, transparencies, and posters.
- If possible, present a three-dimensional model of veins and arteries in the body and have students locate major vessels.
- Have students note locations of major vessel junctions.
- Have students note areas in which greatest concentration of vessels are found and suggest reasons for concentrations at those points.

Objective 8: Arrange in order steps in the process of portal circulation.

- Have students identify the organs associated with portal circulation.
- Have students discuss the importance of each organ and identify elements in the bloodstream affected by each.
- If possible, use a three-dimensional model to demonstrate the path of portal circulation.

Objective 9: Label the lymph nodes.

Objective 10: Choose the word or phrase that completes statements about the lymphatic system.

- Have students discuss similarities and differences between blood and lymph.
- Many students will associate lymph nodes with cancer. They may be unaware of actual lymphatic functions. Begin the discussion by asking students what they know about lymph nodes.
- Have students compare the locations of veins, arteries, and lymph nodes.

Objective 11: Select from a list functions of the spleen.

- Compare functions of the spleen to functions of the circulatory system as a whole and to functions of the heart.
- Have students locate the spleen and identify its position in the path of blood.

APPLICATION

Objective 12: Communicate about how the circulatory system works.

- Use the assignment sheet to introduce students to the effects of life-style on the circulatory system.
- As an alternative, have students, as a group project, videotape a 15-minute program on how to improve circulatory system performance.
- Use Objective 12 to meet HOSA integration goals.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on the assignment sheet if not previously done.

- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- *Opportunities for Learning, Inc.*, 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700 offers the following:

  Anatomy and Physiology Filmstrips: The Cardiovascular System–Unit 7, Includes filmstrip with cassette and instructor's guide.

  Human Systems Filmstrip Sets, Circulation in the Human Body and Circulation in the Human Body II. First film covers path from capillaries of small intestine through veins, liver, heart, and lungs, then back to the small intestines, including coronary circulation. Second film covers remaining cardiovascular system functions, including blood pressure and heart rate. (Filmstrips with cassettes, student self-instruction script booklet.)

  Systems of the Body Filmstrip Set. Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700. Includes four filmstrips with cassettes covering Skeletal and Muscular Systems, Nervous and Respiratory Systems, Circulatory and Lymphatic Systems, and Digestive and Excretory Systems.

- *Human Body Series: Circulatory System*, 1980. Oklahoma Department of Vocational and Technical Education, Resource Center 39, 1500 W. Seventh Avenue, Stillwater, OK 74074-4364. Discusses heart action, plasma, platelets, RBCs, WBCs, lymph, nutrients, wastes, and circulation. Available to Oklahoma teachers on a free-loan basis. (16 minutes, color, VHS)

- *Your Active Body Series: Heart and Circulation*. Health Edco., P. O. Box 21207, Waco, TX 76702-1207, 800-299-3366, fax 817-751-0221. Covers heart rate, blood pressure, stress tests, blood composition, and gravity's affect of blood flow. (10 minutes, color, VHS)

Print Media

- *Anatomical Charts from Peter Bachin and Ernest Beck Series*, Health Edco, P.O. Box 21207, Waco, TX 76702-1207, 1-800-299-3366, FAX 1-817-751-0221. Available in framed, rods, or spiral formats.

- Tilkian, Ara. G, and Elaine Kiess Daily. *Cardiovascular Procedures: Diagnostic Techniques and Therapeutic Procedures*, The Nurse's Book Society, Delran, NJ 08370.

- Huang, Shelia, *Coronary Care Nursing*, The Nurse's Book Society, Delran, NJ 8037-.

Software

- *Opportunities for Learning, Inc.*, 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700 offers the following:

  Body in Focus. Includes keyboard overlay, program guide, and resource material. Allows students to examine the head, arm, and torso layer by layer. Simulates pumping blood, breathing. Software for Apple, 48K, and IBM, 48K.

  Human Circulatory System, Software with study guide. Covers functions of arteries, capillaries, and veins through high-resolution graphics. Software for Apple 48K or IBM 64K.

  The Human Body: An Overview. Includes multiple choice, true-false, and short answer review. Accompanying courseware kit and teacher's guide. Software for Apple 48K.

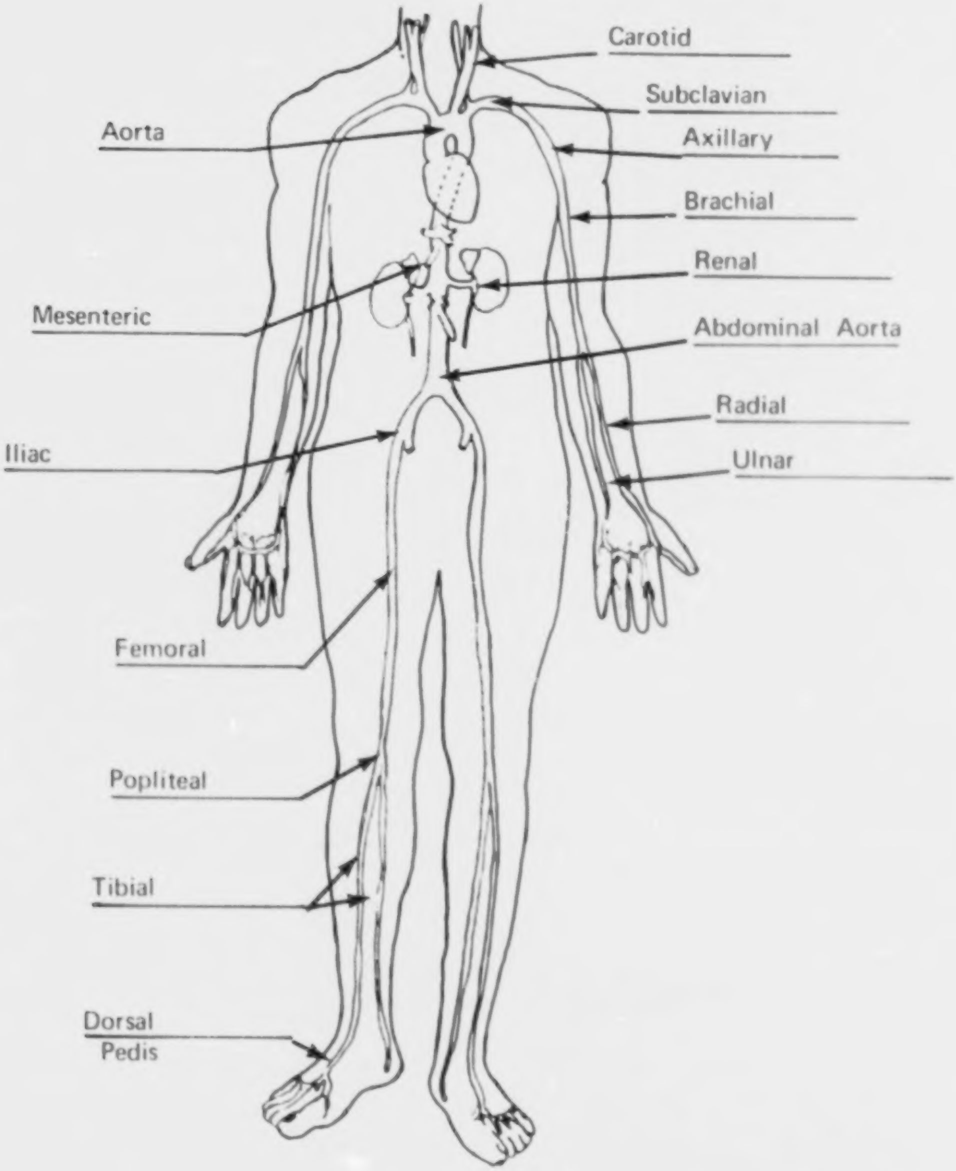
UNIT REFERENCES

- Duncan, Betty. *Allied Health Careers*. Oklahoma Department of Vocational and Technical Education: Stillwater, OK, 1987.

- Fong, Elizabeth, Elvira B. Ferris, and Esther G. Skelley. *Body Structures and Functions*. Delmar Publishers: Albany, NY, 1989.

- Kellum, Mary. *Anatomy and Physiology*. Mid-America Vocational Curriculum Consortium, Inc.: Stillwater, OK, 1984.

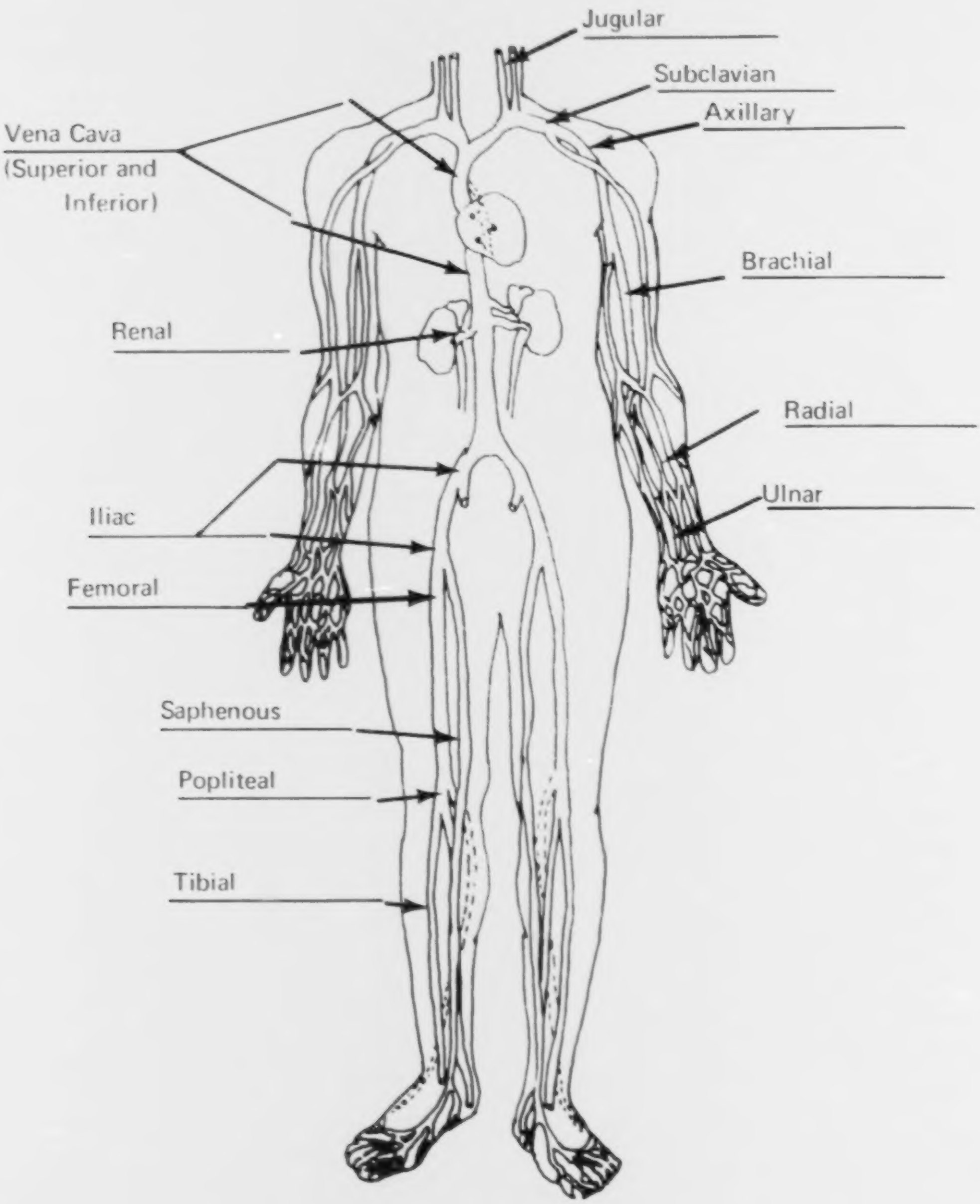
ARTERIES


Carotid
Subclavian
Aorta
Axillary
Brachial
Renal
Mesenteric
Abdominal Aorta
Radial
Iliac
Ulnar
Femoral
Popliteal
Tibial
Dorsal Pedis

May be photocopied for student use

520

VEINS


Jugular
Subclavian
Axillary
Vena Cava (Superior and Inferior)
Brachial
Renal
Radial
Ulnar
Iliac
Femoral
Saphenous
Popliteal
Tibial

May be photocopied for student use

INFORMATION SHEET

THE CIRCULATORY SYSTEM

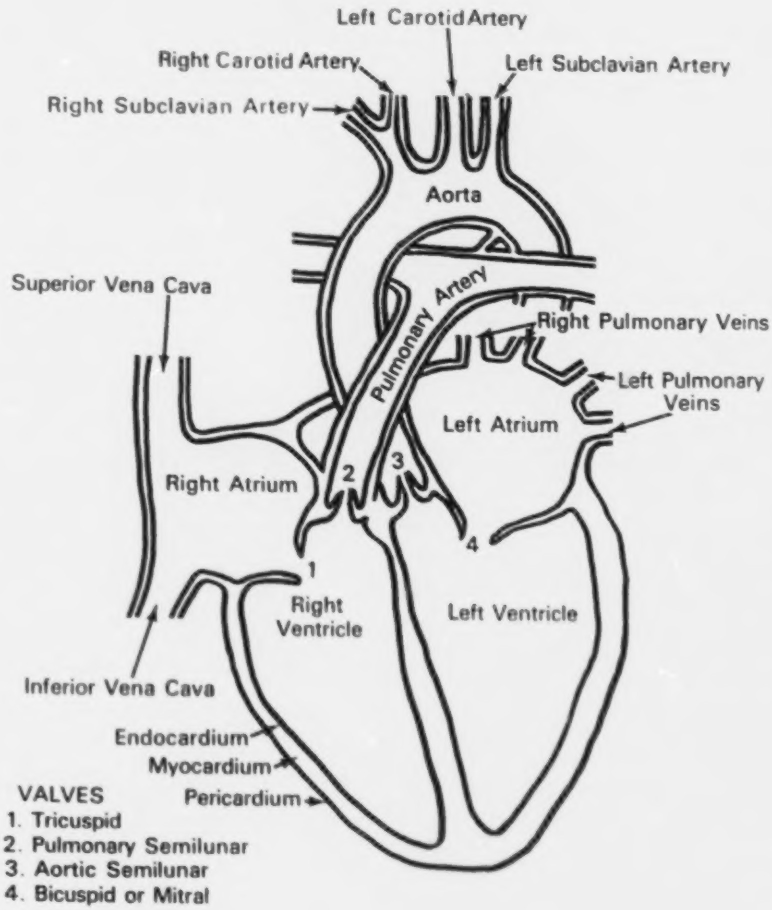
X

OBJECTIVE 1

Match terms associated with the circulatory system to their definitions.

- **aorta** – the main trunk of the arterial system; the largest artery
- **arteriole** – a very small artery that leads to a capillary
- **artery** – a blood vessel that carries blood from the heart
- **atrium** – one of two upper chambers or compartments of the heart

  NOTE: The right atrium receives venous blood as it returns from the body; the left atrium receives blood from the lungs and pumps it into the left ventricle.


Left Carotid Artery
Right Carotid Artery
Left Subclavian Artery
Right Subclavian Artery
Aorta
Superior Vena Cava
Pulmonary Artery
Right Pulmonary Veins
Left Pulmonary Veins
Left Atrium
Right Atrium
2
3
4
1
Right Ventricle
Left Ventricle
Inferior Vena Cava
Endocardium
Myocardium
Pericardium
VALVES
1. Tricuspid
2. Pulmonary Semilunar
3. Aortic Semilunar
4. Bicuspid or Mitral

- **capillary** – a minute blood vessel between arterioles and venules; a similar channel containing lymph

- **cardiology** – the study of the heart

- **circulatory system** – the organs and structures involved in the movement of blood

- **coronary** – vessels that supply blood to the walls of the heart

- **diastole** – the period of time when the heart rests between contractions

- **endocardium** – the very smooth layer of cells that lines the inside of the heart and forms the valves

- **lymph nodes** – small bundles of special lymphoid tissue

  NOTE: Lymph nodes are also called "lymph glands."

- **myocardium** – the middle and thickest layer of the heart wall; the muscle layer

- **pericardium** – the double membrane that covers the heart and secretes fluid that provides lubrication to prevent friction during heart action

- **septum** – the wall in the middle of the heart that divides it into right and left sides

- **systole** – the period of time when the heart contracts

- **valve** – a membranous structure in a hollow organ or passage that temporarily closes to permit flow of fluid in one direction only

- **vein** – a blood vessel that carries blood to the heart

- **venous sinuses** – a network of spaces in the brain covering's outer layer that drain blood from the brain into the jugular vein

- **ventricle** – the two lower pumping chambers of the heart

- **venule** – a small vein

OBJECTIVE 2

Select from a list functions of the circulatory system.

- Transports food and oxygen to body cells
- Transports waste products to excretory organs
- Distributes hormones and antibodies
- Controls body temperature
- Maintains homeostasis

OBJECTIVE 3

Choose the word or phrase that completes statements about blood pressure and heart rate.

- **blood pressure** – the amount of pressure exerted on the walls of the blood vessels during the contraction of the heart; keeps blood flowing between heart beats

  NOTE: The contraction is called the systole and the relaxation is called the diastole. Blood pressure is written systole/diastole (140/90 where 140 is the systole and 90 is the diastole).

- **heart rate** – the number of heart beats per minute.

  NOTE: Normal heart rate is 60-100, but varies according to age, gender, and body temperature.

OBJECTIVE 4

Distinguish among structures of the blood vessels.

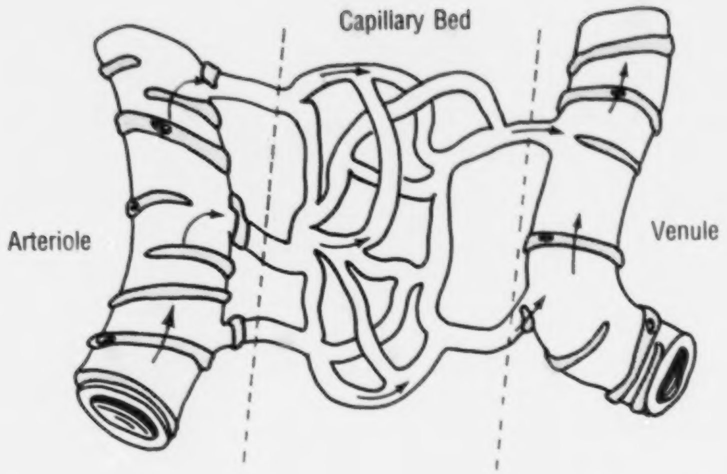
Arteries

- Have the thickest walls of all blood vessels; artery walls have three layers of muscles, the center layer is the thickest
- Carry blood from the pumping chambers (ventricles) to the organs

  NOTE: Blood pressure is highest in the arteries nearest the heart. As the blood pressure decreases, the thickness of the arteries also decreases.

Capillaries

- Have a single layer of cells that form a tube barely large enough to permit passage of blood cells
- Transport materials necessary to cellular life through walls into tissues; absorb tissue waste products through walls
- Connect arterioles and venules



Veins

- Have less muscle tissue than arteries
- Transport blood back to the heart under low pressure
- Are equipped with one-way valves that permit the blood to flow in only one direction

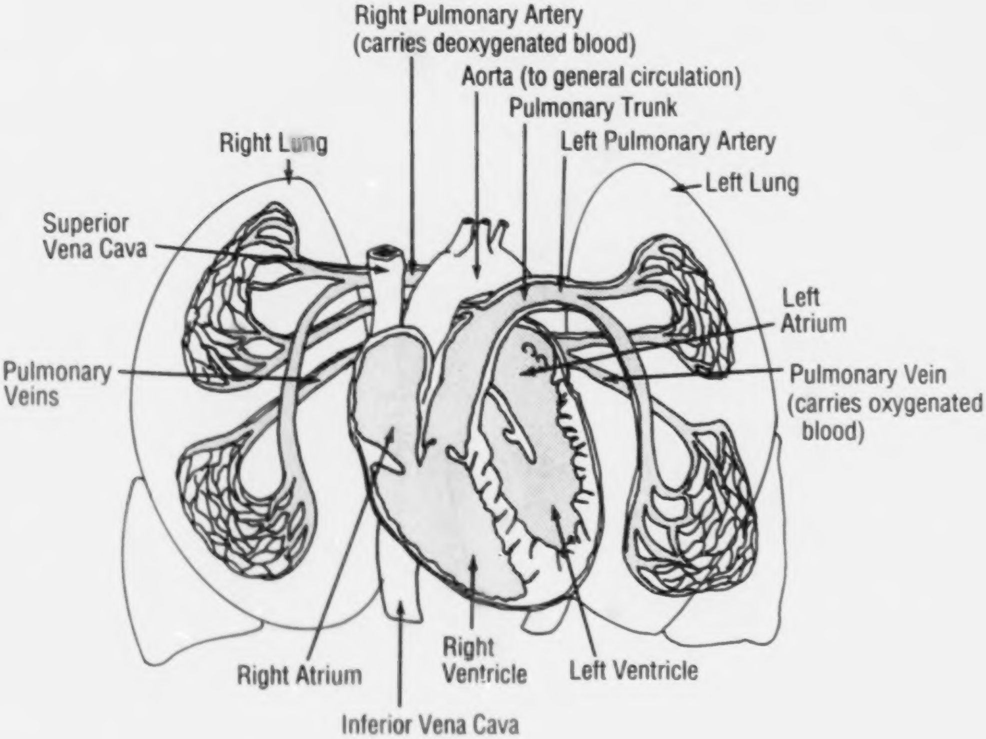
OBJECTIVE 5

Arrange in order steps in the process of blood circulation.

Systemic (entire body)

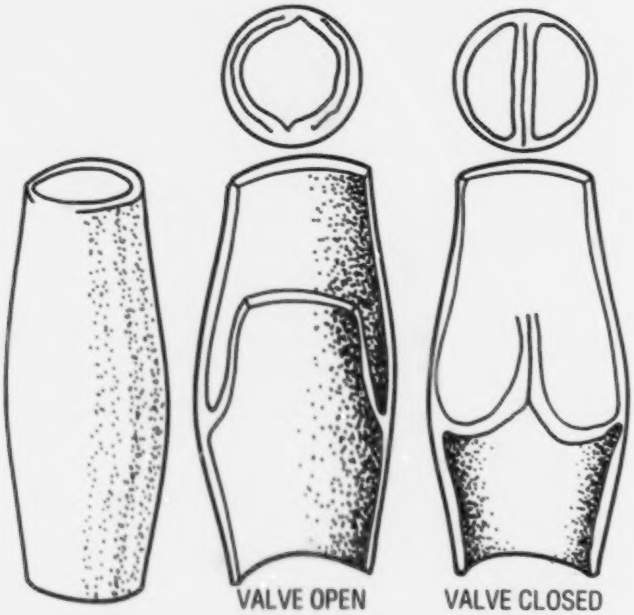
1. Blood in the left ventricle travels through the aortic semilunar valve into the aorta.
2. Blood leaves the heart through the aorta.
3. Blood is distributed throughout the body by traveling through arteries.

4. From arteries, blood travels through smaller arterioles.
5. At the point where food and oxygen are exchanged for waste products and carbon dioxide, arterioles become a network of capillaries.
6. At the other side of the capillaries, venules collect the deoxygenated blood cells.
7. Venules collect into larger veins.
8. Veins lead to the inferior or superior vena cava which leads to the heart.
9. Blood re-enters the heart at the right atrium, then begins pulmonary circulation.


Right Pulmonary Artery (carries deoxygenated blood)
Aorta (to general circulation)
Pulmonary Trunk
Left Pulmonary Artery
Right Lung
Left Lung
Superior Vena Cava
Left Atrium
Pulmonary Veins
Pulmonary Vein (carries oxygenated blood)
Right Atrium
Right Ventricle
Left Ventricle
Inferior Vena Cava

Pulmonary (lungs)

1. From the right atrium, blood travels through the tricuspid valve and into the right ventricle.
2. Blood is pumped through the pulmonary semilunar valve and into the pulmonary artery.
3. The deoxygenated blood flows through arterioles in the lungs.
4. From the arterioles, it flows through capillaries, where it exchanges carbon dioxide for oxygen.
5. Capillaries collect into venules.
6. The oxygenated blood enters the pulmonary vein and flows back to the heart.
7. The now re-oxygenated blood enters at the left atrium.
8. From the left atrium, blood flows through the bicuspid or mitral valve into the left ventricle and begins systemic circulation.



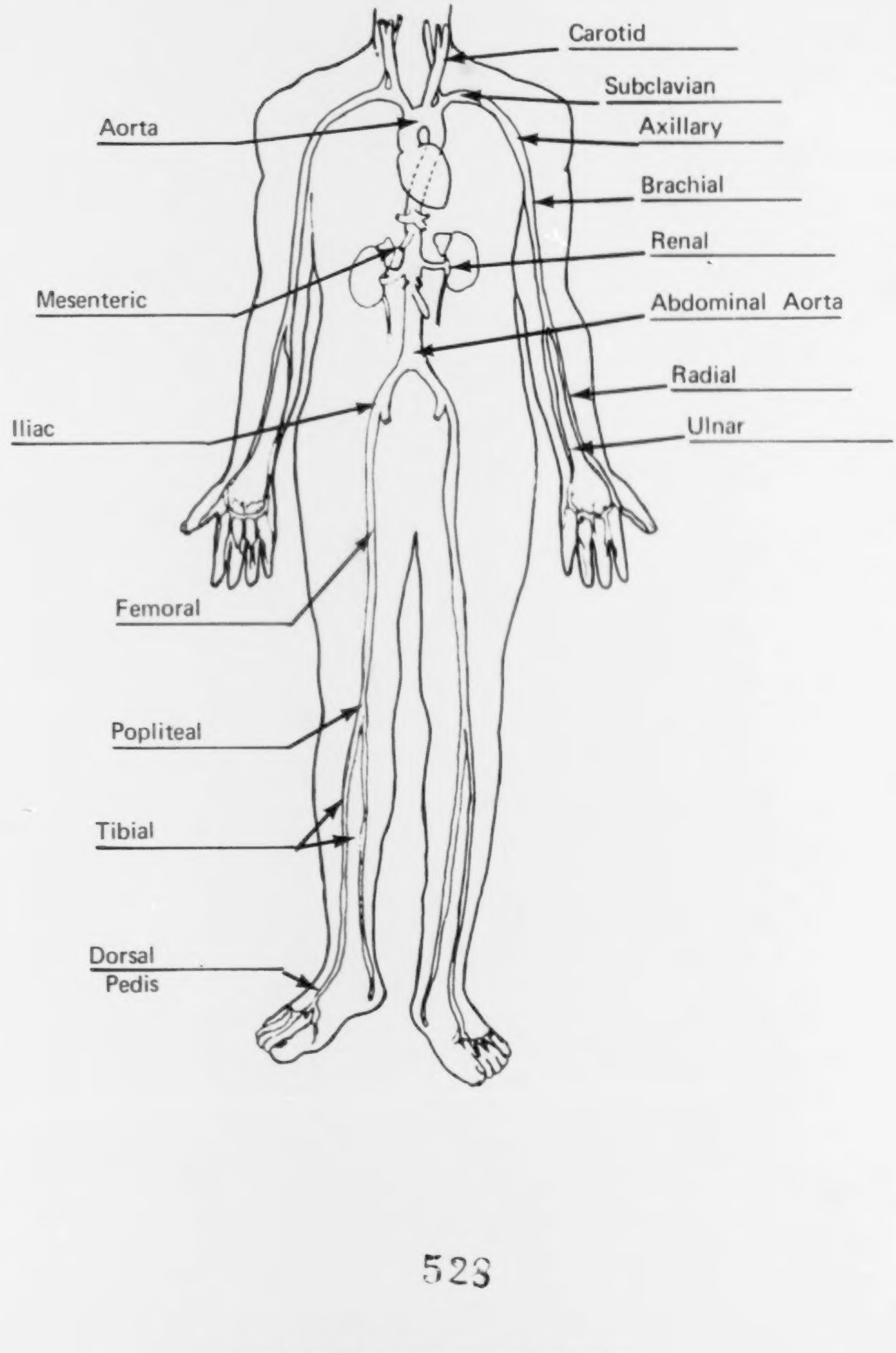
VALVE OPEN
Lateral View

VALVE CLOSED
Medial View

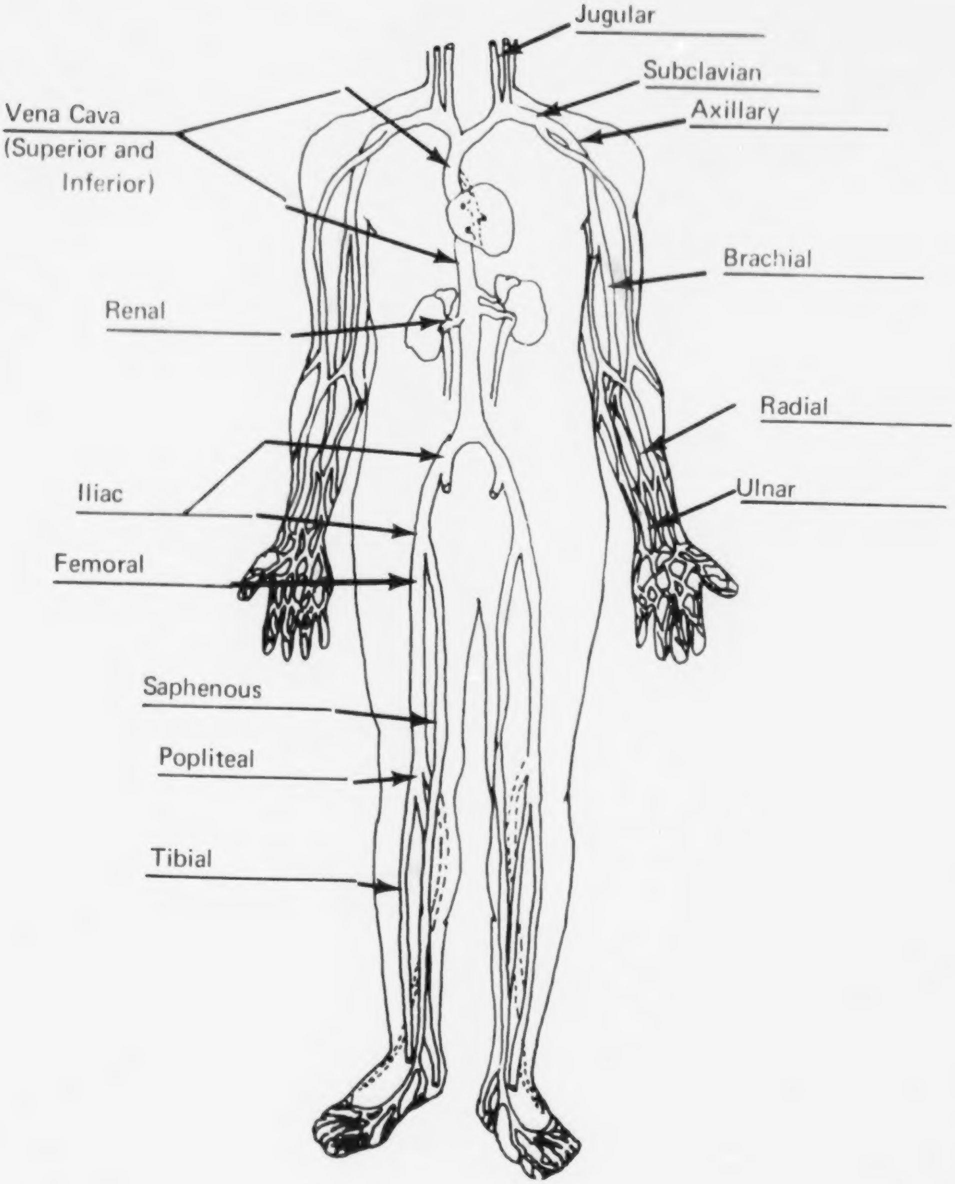
Veins Contain bicuspid valves which open in the direction of the blood flow, but prevent backward flow when pockets become filled

OBJECTIVE 6 **Label the principal arteries and veins.**

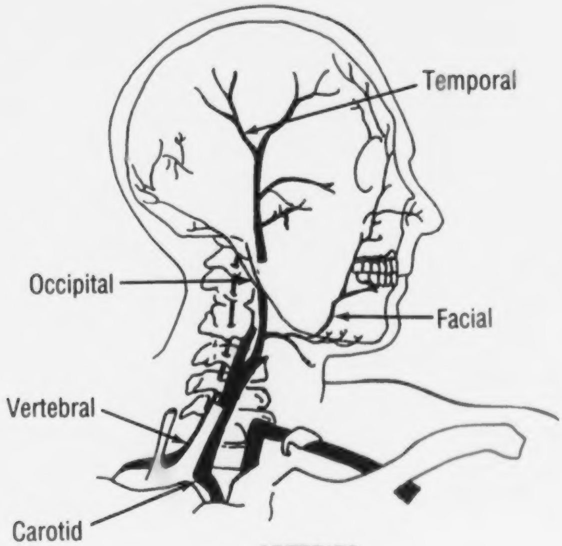
ARTERIES


Carotid
Subclavian
Aorta
Axillary
Brachial
Renal
Mesenteric
Abdominal Aorta
Radial
Iliac
Ulnar
Femoral
Popliteal
Tibial
Dorsal Pedis

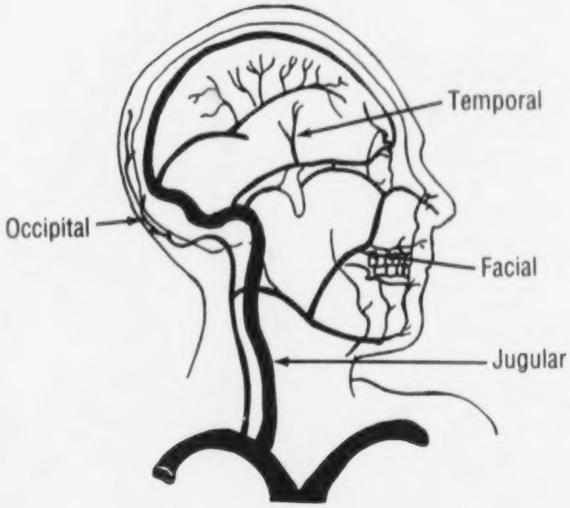
VEINS


Jugular
Subclavian
Vena Cava (Superior and Inferior)
Axillary
Brachial
Renal
Radial
Iliac
Ulnar
Femoral
Saphenous
Popliteal
Tibial

OBJECTIVE 7 **Label the cranial vessels.**


Temporal
Occipital
Facial
Vertebral
Carotid

ARTERIES

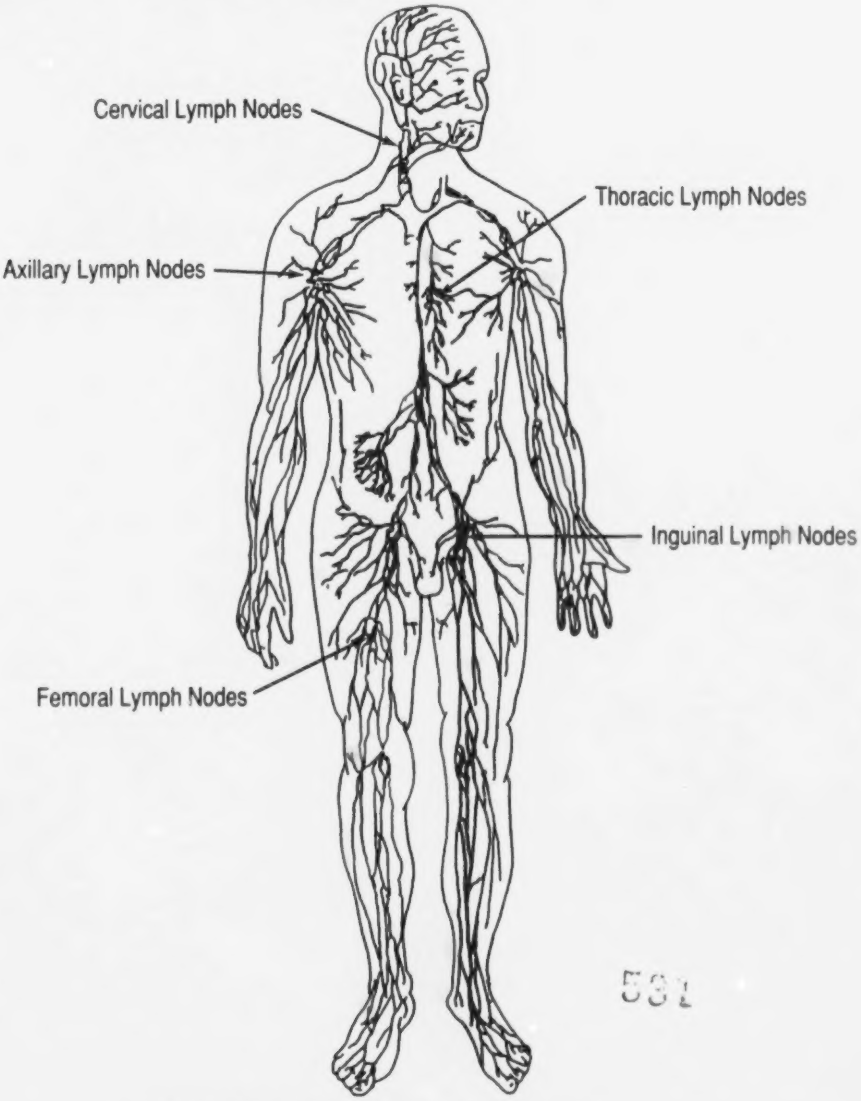

Temporal
Occipital
Facial
Jugular

VEINS

OBJECTIVE 8 **Arrange in order steps in the process of portal circulation.**

1. Vessels from the stomach, intestine, spleen, and pancreas empty into one vessel, the portal vein.
2. The portal vein carries the blood, loaded with digested food, to the liver.
3. The liver extracts food materials for storage and modification and removes toxins.
4. Blood leaves the liver through the hepatic veins that empty into the inferior vena cava.

OBJECTIVE 9 **Label the lymph nodes.**


Cervical Lymph Nodes
Thoracic Lymph Nodes
Axillary Lymph Nodes
Inguinal Lymph Nodes
Femoral Lymph Nodes

OBJECTIVE 10

Choose the word or phrase that completes statements about the lymphatic system.

- Lymph nodes are found along the lymph system.
- Some body organs, such as the tonsils, adenoids, and spleen are formed of lymph tissue.
- A network of very small lymph capillaries collects excess tissue fluid and certain waste products from the body cells.
- Lymph fluid resembles plasma in composition, but contains less protein.
- Lymph drainage from the intestinal area may be milky in appearance due to fatty contents after a meal.
- Lymph capillaries empty into larger vessels and finally drain into the thoracic duct and the right lymphatic duct.
- Two main lymphatic channels empty into the veins at the base of the neck where the lymph mixes with the blood plasma.
- The flow of lymph is slow and is aided by muscular contractions and by valves that keep it from flowing backward.

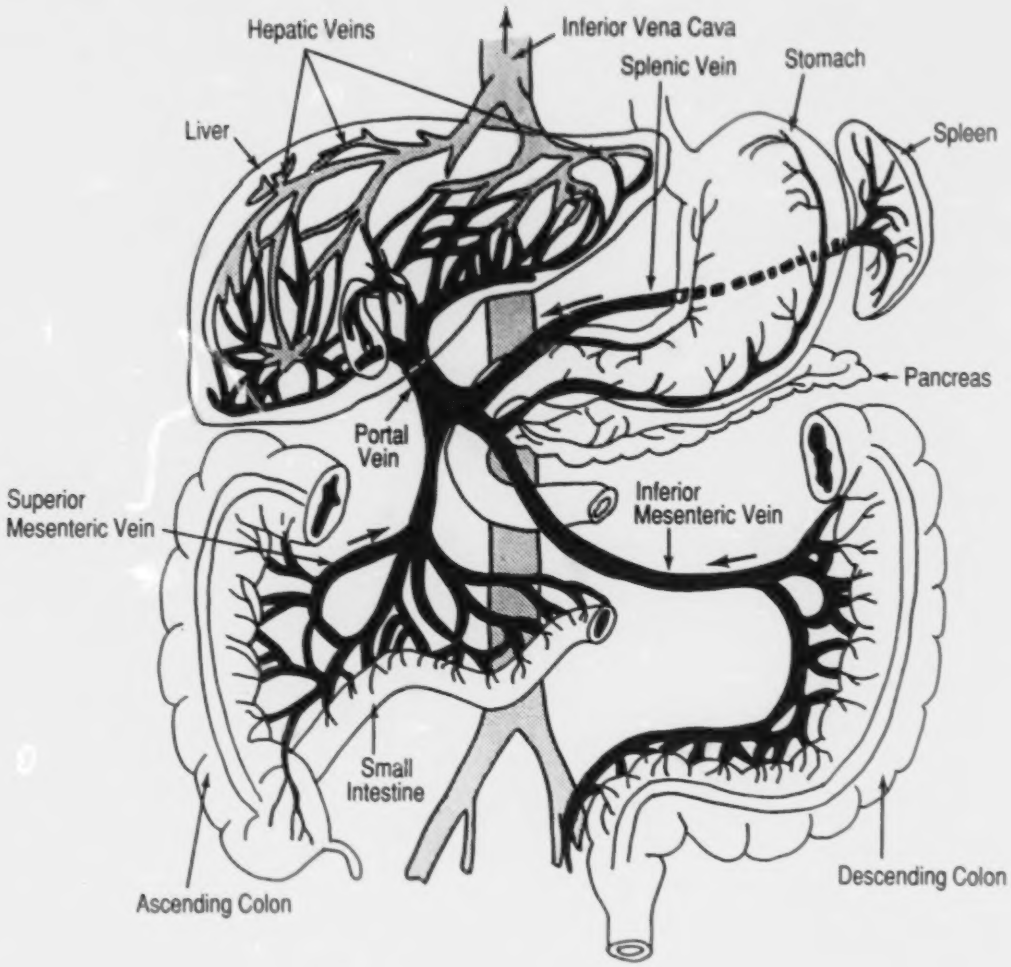
OBJECTIVE 11

Select from a list functions of the spleen.

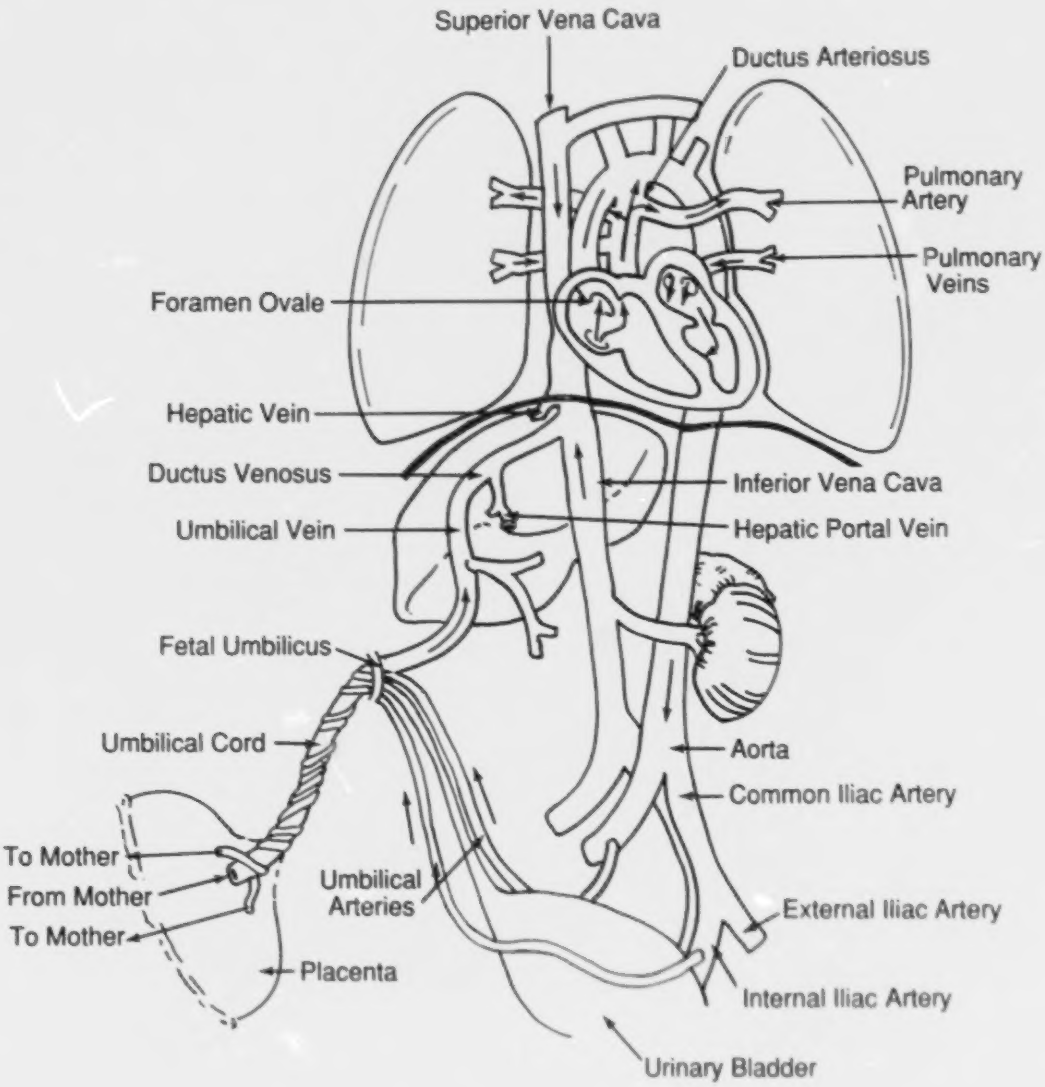
The spleen is the largest mass of lymphoid tissue. It lies in the upper abdomen, behind the stomach. It can be removed, if necessary, without ill effect.

- Stores blood
- Destroys old, red blood cells
- Filters out dead blood cells and cancer cells
- Destroys bacteria
- Manufactures lymphocytes
- Produces antibodies

PORTAL CIRCULATION

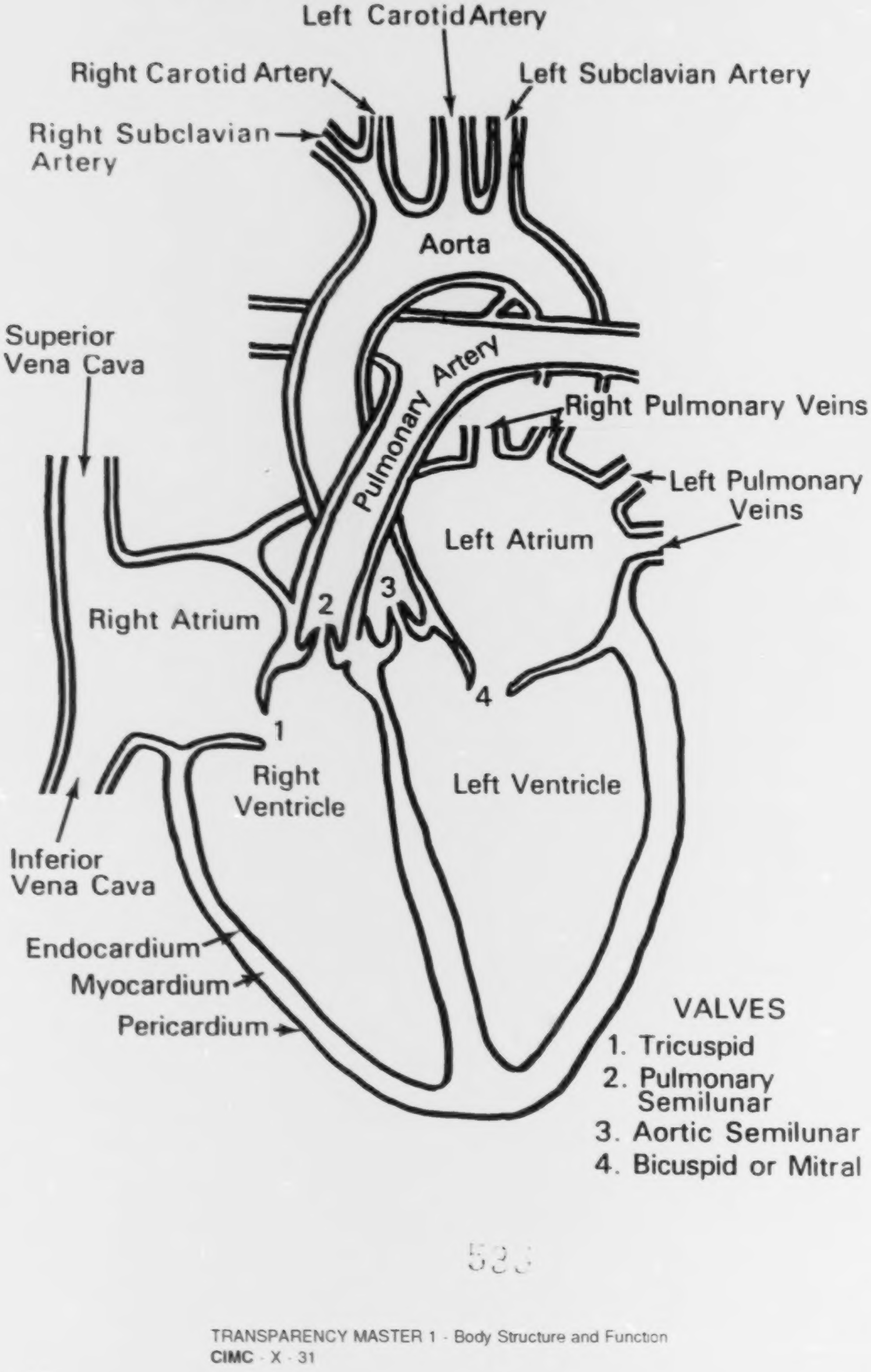

Hepatic Veins
Inferior Vena Cava
Splenic Vein
Stomach
Liver
Spleen
Pancreas
Portal Vein
Superior Mesenteric Vein
Inferior Mesenteric Vein
Small Intestine
Ascending Colon
Descending Colon

FETAL CIRCULATION


Superior Vena Cava
Ductus Arteriosus
Pulmonary Artery
Pulmonary Veins
Foramen Ovale
Hepatic Vein
Ductus Venosus
Inferior Vena Cava
Umbilical Vein
Hepatic Portal Vein
Fetal Umbilicus
Umbilical Cord
Aorta
Common Iliac Artery
To Mother
From Mother
Umbilical Arteries
External Iliac Artery
To Mother
Placenta
Internal Iliac Artery
Urinary Bladder

534

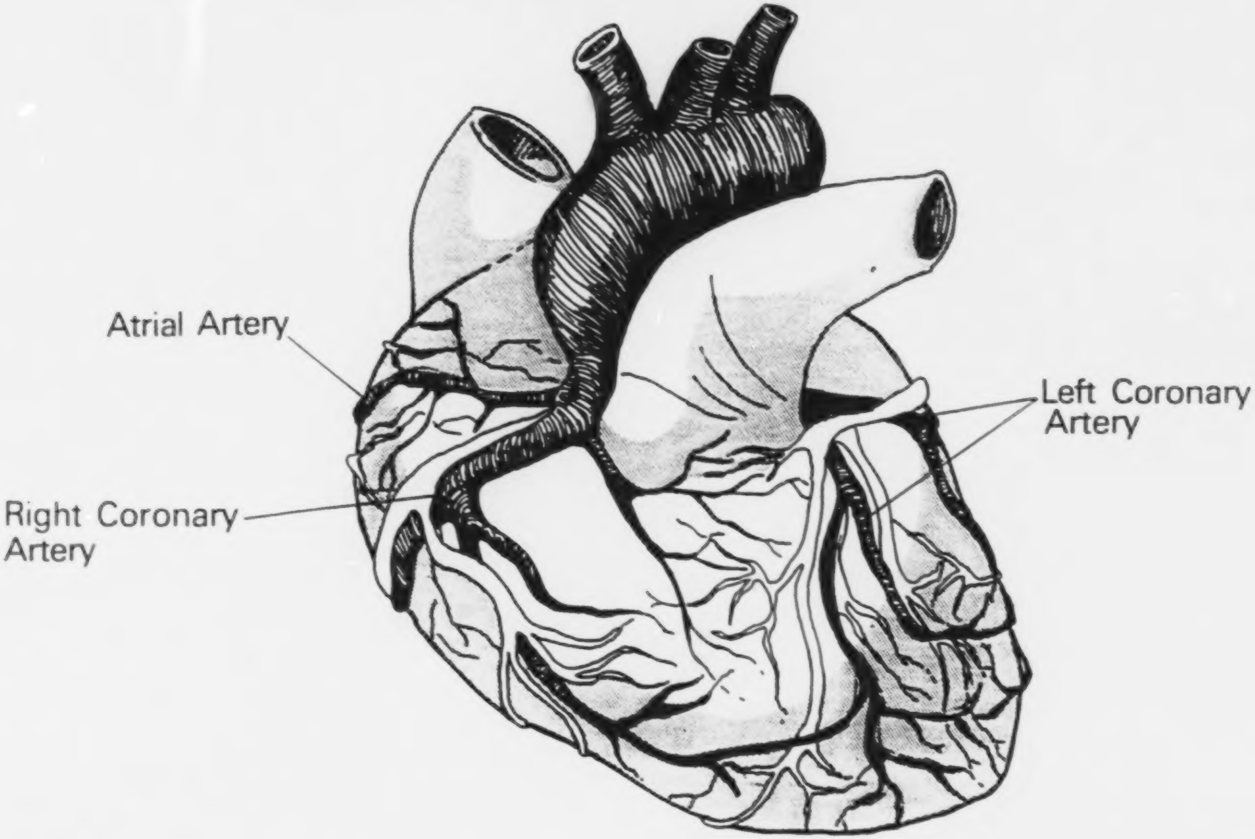
Structure of the Heart


Left Carotid Artery
Right Carotid Artery
Left Subclavian Artery
Right Subclavian Artery
Aorta
Superior Vena Cava
Pulmonary Artery
Right Pulmonary Veins
Left Pulmonary Veins
Left Atrium
Right Atrium
2
3
4
1
Right Ventricle
Left Ventricle
Inferior Vena Cava
Endocardium
Myocardium
Pericardium

VALVES

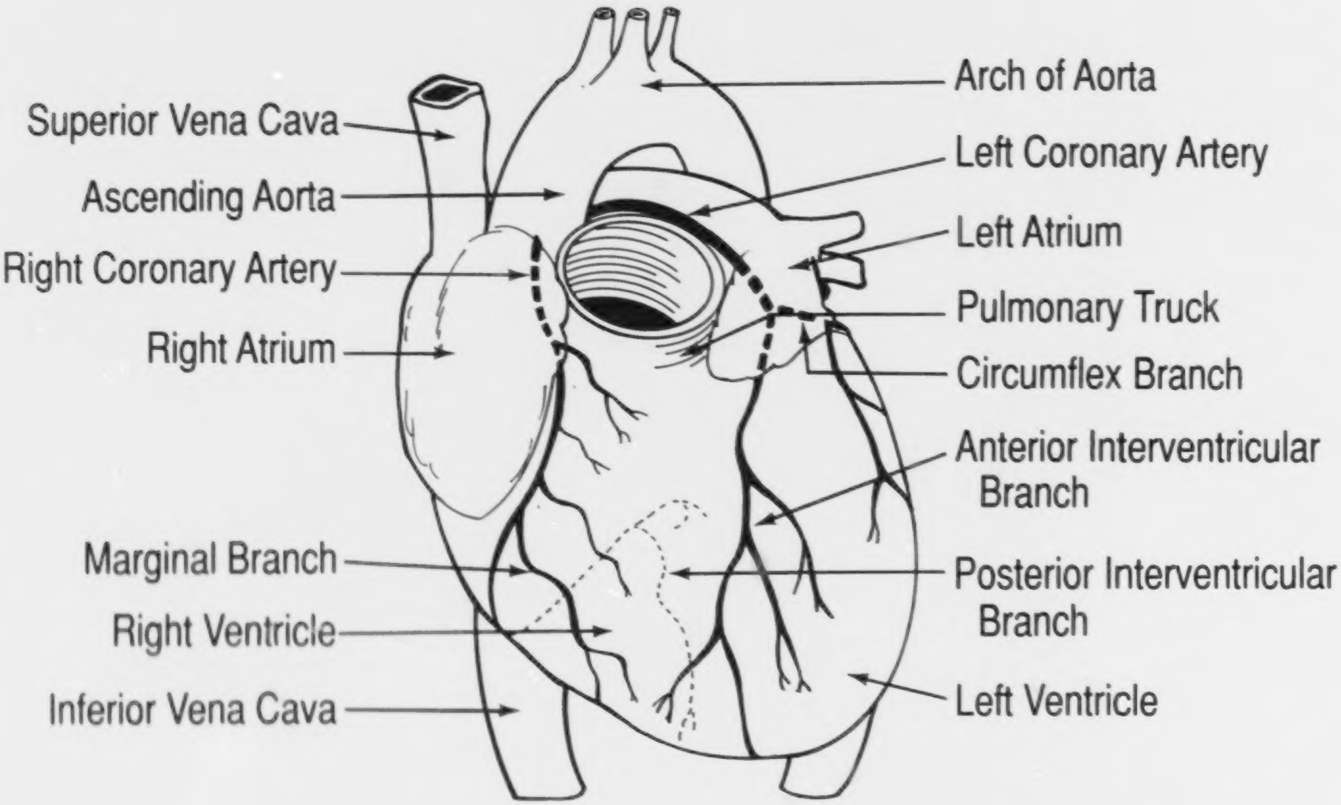
1. Tricuspid
2. Pulmonary Semilunar
3. Aortic Semilunar
4. Bicuspid or Mitral

Blood Supply to the Heart


Atrial Artery
Left Coronary Artery
Right Coronary Artery

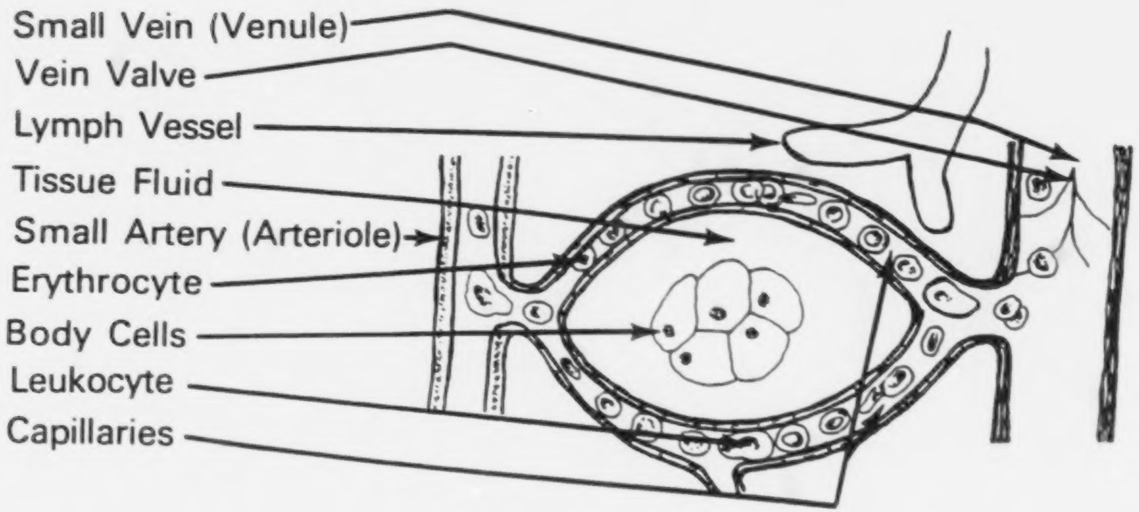
(Coronary arteries surround the heart)

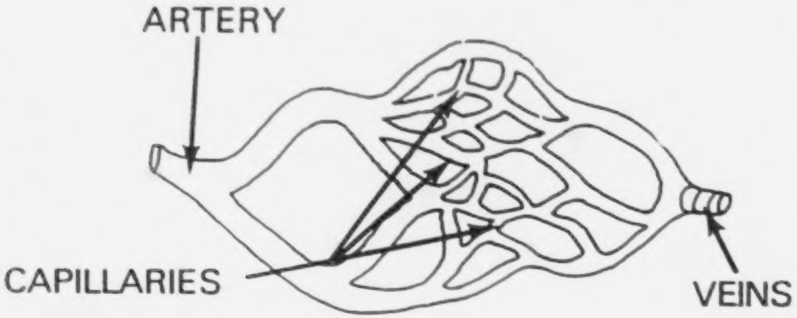
Coronary Circulation


Superior Vena Cava
Ascending Aorta
Right Coronary Artery
Right Atrium
Marginal Branch
Right Ventricle
Inferior Vena Cava
Arch of Aorta
Left Coronary Artery
Left Atrium
Pulmonary Truck
Circumflex Branch
Anterior Interventricular Branch
Posterior Interventricular Branch
Left Ventricle

TRANSPARENCY MASTER 3 · Body Structure and Function
CIMC · X · 35

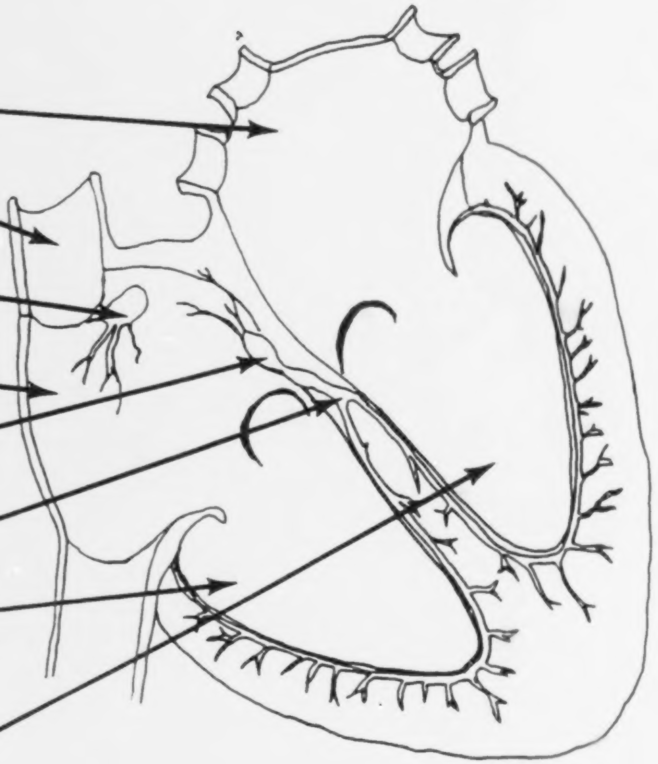
Capillary Function


Small Vein (Venule)
Vein Valve
Lymph Vessel
Tissue Fluid
Small Artery (Arteriole)
Erythrocyte
Body Cells
Leukocyte
Capillaries


ARTERY
CAPILLARIES
VEINS

TRANSPARENCY MASTER 5 Body Structure and Function
CIMC X 39

Conduction System of the Heart



LEFT ATRIUM

SUPERIOR VENA CAVA

SINOATRIAL NODE

RIGHT ATRIUM

ATRIOVENTRICULAR NODE

ATRIOVENTRICULAR BUNDLE
(Bundle of His)

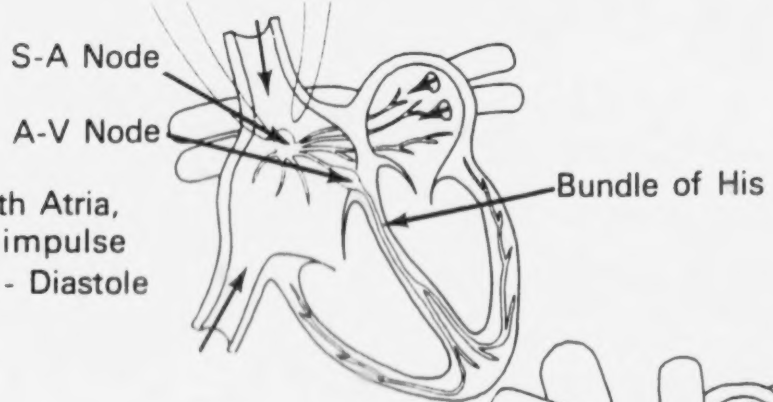
RIGHT VENTRICLE

LEFT VENTRICLE

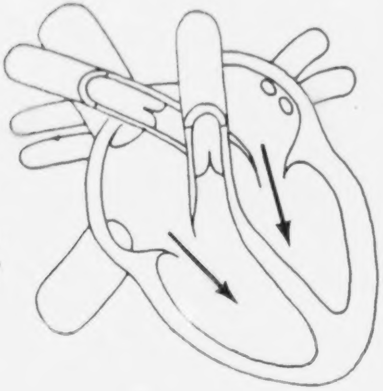
542

543

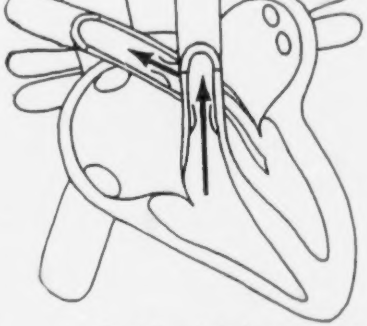
The Heart Pumping Cycle



1. Blood fills both Atria, stimulating impulse in SA node - Diastole



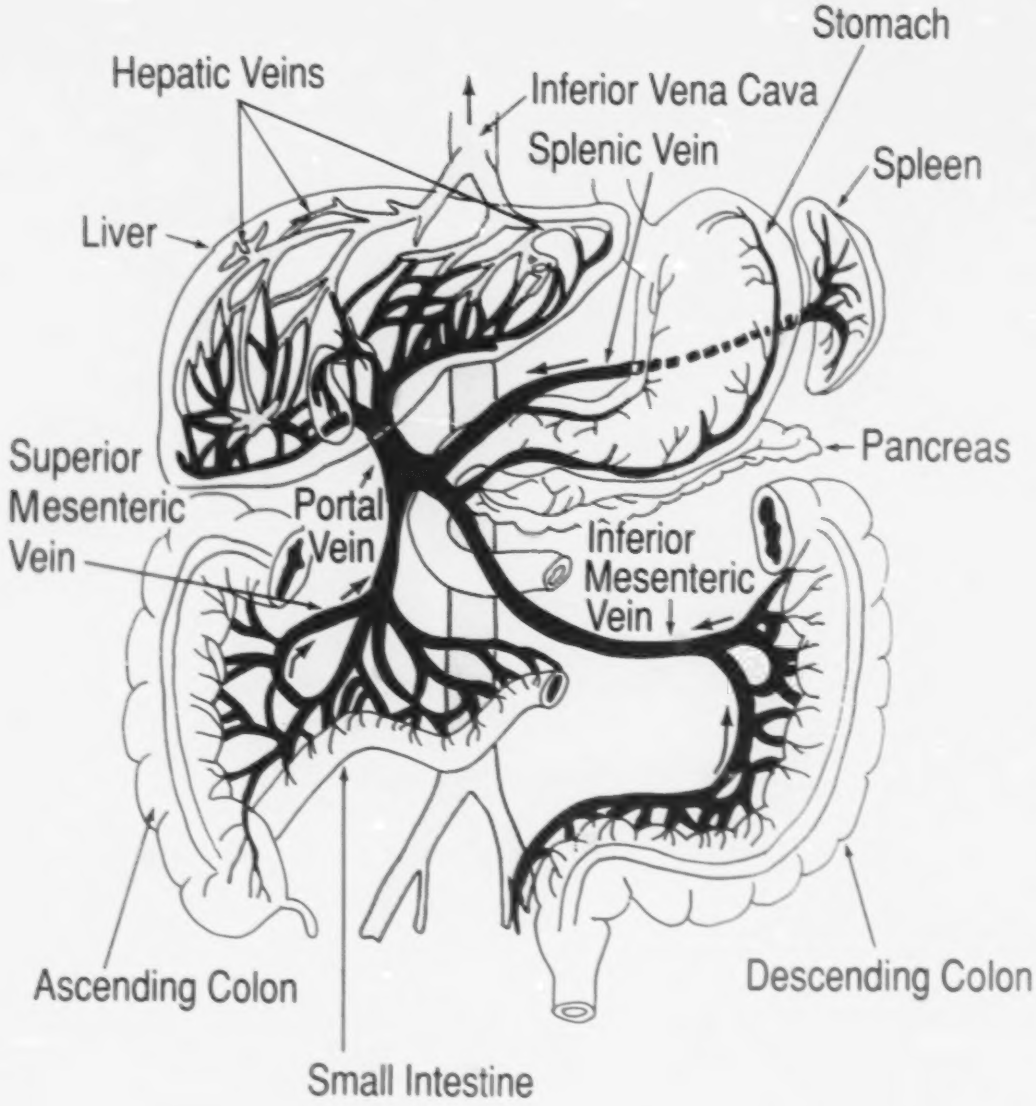
2. Atria contract, squeezing blood into Ventricles. AV node is stimulated, transmitting impulse to Bundle of His



3. Ventricles contract, squeezing blood into Aorta and Pulmonary Arteries - Systole

TRANSPARENCY MASTER 6 - Body Structure and Function
CIMC - X - 41

Portal Circulation


Stomach
Hepatic Veins
Inferior Vena Cava
Splenic Vein
Spleen
Liver
Pancreas
Superior Mesenteric Vein
Portal Vein
Inferior Mesenteric Vein
Ascending Colon
Descending Colon
Small Intestine

546

ACTIVITY SHEETS 1-2

Development of:
READING SKILLS
SCIENCE SKILLS

- Introduce the assignment to the students by discussing why reading and science skills are important.
- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  – Interpret graphics and symbols

  SCIENCE SKILLS

  – Investigate/apply principles of anatomy/physiology

- If students have difficulty interpreting graphics and symbols:
  - Remind them that interpreting a graphic is very similar to reading a page. Each part of the graphic or symbol has a meaning within the art.
  - Suggest that, when they have a graphic, chart, diagram, or table to interpret, they should carefully study the art and compare it to any similar pieces encountered. Also study the key or any other information that will help you understand the meaning of the graphic.
- If students have difficulty investigating/applying the principles of anatomy/physiology, remind them that it is important in any area of work or study to have consistent ideas or principles that everyone uses. Explain that sometimes it is necessary to express these in graphic format so that it will be easy for people to relate them to the body.

ACTIVITY SHEET 1

THE CIRCULATORY SYSTEM

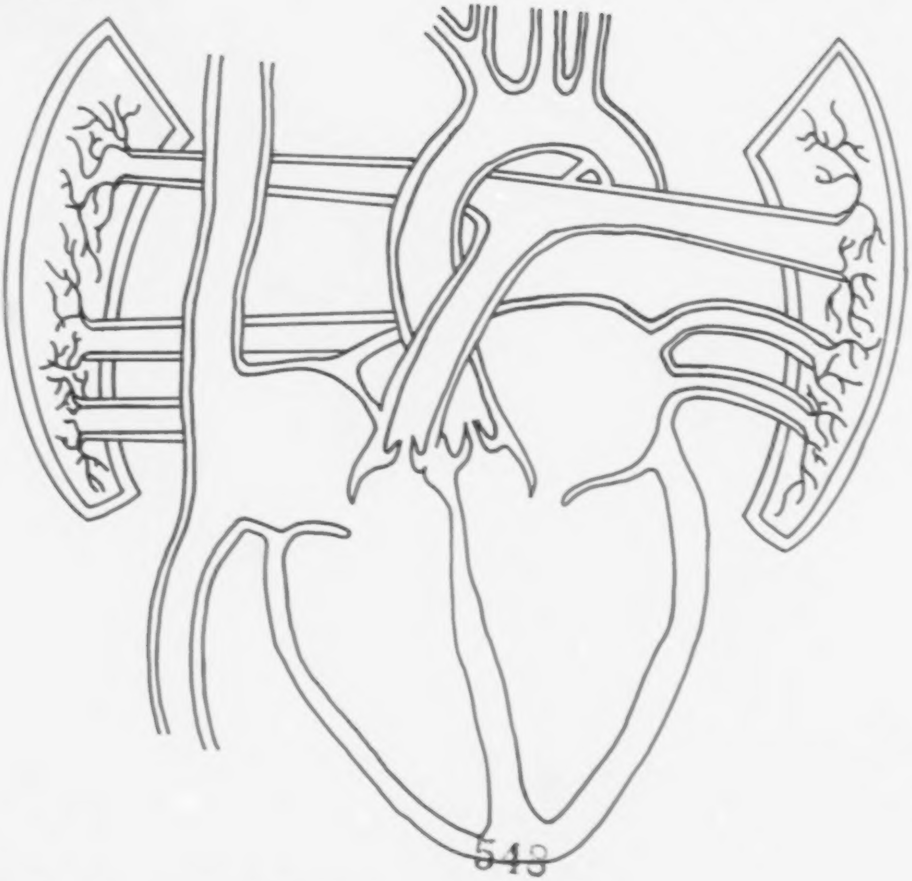
X

Trace a drop of blood through the heart.

Use the diagram below to trace a drop of blood through the heart. Use blue arrows to indicate the deoxygenated blood and red arrows to indicate the oxygenated blood.

Functional Reading Skills
- Interpret graphics & symbols (charts, diagrams, graphs, signs, etc.)

Life Science Skills
- Investigate/apply principles of anatomy/physiology



ACTIVITY
SHEET 2

THE CIRCULATORY SYSTEM

X

Trace a drop of blood through the body.

Trace the route of a drop of blood through one complete cycle of the body. Start at the point given to you by your instructor. Describe the journey or illustrate it with a picture or chart. You might draw a poster, prepare a skit, or prepare to give an oral report on the pathways, organs, changes, and functions along the route.

Functional Reading Skills

- Interpret graphics & symbols (charts, diagrams, graphs, signs, etc.)

Life Science Skills

- Investigate/apply principles of anatomy/physiology

ASSIGNMENT SHEET

Development of:
READING SKILLS
WRITING SKILLS
ORAL COMMUNICATION SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why reading, writing, employability, and oral communication skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Select useful resources

  WRITING SKILLS

  - Take notes
  - Use standard grammar and correct spelling, punctuation, and capitalization
  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use good speaking techniques
  - Make informative presentations

  EMPLOYABILITY SKILLS

  - Developing self confidence/esteem

- If students have difficulty selecting resources:

  - Review with them the different types of resources available to them. Have volunteers tell which type of information can be found in each resource type.
  - Have them decide the types of resource material that will be most useful to them.

  - Help them learn how to locate each resource in libraries, resource centers, or media centers.

- If students have difficulty taking notes:
  - Remind them that they take notes as they read so that when they are ready to prepare the final product, they will have the information they need in an easy to use format. Explain that because the notes they take are for their own use, they should develop their own note-taking style.
  - Have students volunteer to discuss some of their own note-taking tricks and techniques. Suggest that others may wish to experiment with some of these techniques.
  - Remind the students that they should always take notes in their own words instead of copying directly from the original source. This makes it easier when it is time to prepare the final project.

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:
  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.
  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.
  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.
  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.
  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using good speaking techniques:

  - Remind them to speak clearly; their voices should be loud enough to be heard, but not so loud to be offensive.

  - Suggest that they practice before doing the actual presenting. Practicing in front of a mirror helps many presenters.

  - Discuss with the group the importance of knowing their information so that their speech is smooth, without long pauses or frequent "eh's." Remind them to stress important facts by slowing down or speaking louder. It is also good to repeat or summarize important points.

- If students have difficulty making informative presentations:

  - Remind them to carefully plan what they want to say and how they want to say it. Suggest that they think about the intended audience as they plan.

  - For additional suggestions about making informative presentations, refer to the suggestions for good speaking techniques and stating ideas clearly also found on this Instructional Supplement.

- If students have difficulty developing self confidence/esteem:
  - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.
  - Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.
  - Allow the students to work in heterogenous groups to enable the less confident students to learn from the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE CIRCULATORY SYSTEM X

Name ______________________________ Score ____________

OBJECTIVE 12 **Communicate about how the circulatory systems works.**

INTRODUCTION

The effectiveness of the circulatory systems may be affected by many things. One of the most important is life-style. Diet, exercise, and stress habits may enhance or weaken the heart, vessels, and other circulatory system structures.

DIRECTIONS

1. Choose one of the topics below.
2. Research the effect on the circulatory system.
3. Prepare a poster, pamphlet, or 2-minute oral report on your findings and present it to the class.
   - Meditation
   - Walking/jogging
   - Owning pets
   - Regular alcohol consumption
   - Yoga or isometric exercises
   - Diets averaging less than 10% fat
   - High sodium intake
   - Low-impact aerobics
   - Volunteering
   - Eating 2 or more eggs every morning

Research and Reference Skills
- Select useful resources

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Research Skills
- Take notes

Oral Presentation Skills
- Make informative presentations
- Use good speaking techniques (pitch, volume, rate, inflection)

Job Acquisition/ Development Skills
- Develop self confidence/esteem

THE CIRCULATORY SYSTEM

ASSIGNMENT SHEET

Students should follow HOSA guidelines. Information presented should be accurate and current. The student should be able to answer related questions after the presentation.

WRITTEN TEST

THE CIRCULATORY SYSTEM

X

Name ______________________________ Score ____________

OBJECTIVE 1

Match terms associated with the circulatory system to their definitions. Write the correct letter in the blank.

Part I

_____ 1. The very smooth layer of cells that lines the inside of the heart and forms the valves

_____ 2. Small bundles of special lymphoid tissue

_____ 3. The wall in the middle of the heart that divides it into right and left sides

_____ 4. The period of time when the heart rests between contractions

_____ 5. A very small artery that leads to a capillary

_____ 6. The double membrane that covers the heart and secretes fluid that provides lubrication to prevent friction during heart action

_____ 7. The period of time when the heart contracts

_____ 8. The middle and thickest layer of the heart wall; the muscle layer

_____ 9. A network of spaces in the brain covering's outer layer that drain blood from the brain into the jugular vein

_____ 10. The study of the heart

a. aorta

b. arteriole

c. capillary

d. cardiology

e. diastole

f. endocardium

g. lymph nodes

h. myocardium

i. pericardium

j. septum

k. systole

l. valve

m. vein

n. venous sinuses

o. venule

May be photocopied for student use

556

Part II

_____ 1. A blood vessel that carries blood from the heart

_____ 2. A blood vessel that carries blood to the heart

_____ 3. The main trunk of the arterial system; the largest artery

_____ 4. A membranous structure in the hollow organ or passage that temporarily closes to permit flow of fluid in one direction only

_____ 5. A minute blood vessel between arterioles and venules; a similar channel containing lymph

_____ 6. One of two upper chambers or compartments of the heart

_____ 7. The organs and structures involved in the movement of blood

_____ 8. A small vein

_____ 9. The two lower pumping chambers of the heart

_____ 10. Vessels that supply blood to the walls of the heart

a. aorta
b. arteriole
c. artery
d. atrium
e. capillary
f. circulatory system
g. coronary
h. endocardium
i. myocardium
j. pericardium
k. septum
l. valve
m. vein
n. ventricle
o. venule

OBJECTIVE 2

Select from a list functions of the circulatory system. Write an "X" in the blank before functions.

_____ 1. Controls rate of nutrient absorption

_____ 2. Destroys abnormal tissue cells

_____ 3. Controls body temperature

_____ 4. Distributes hormones and antibodies

May be photocopied for student use

_____ 5. Produces energy

_____ 6. Transports food and oxygen to body cells

_____ 7. Controls nail and hair growth

_____ 8. Transports waste products to excretory organs

_____ 9. Maintains homeostasis

_____ 10. Cleanses vessels and cavities

OBJECTIVE 3

Choose the word or phrase that completes statements about blood pressure and heart rate. Write the correct letter in the blank.

_____ 1. Blood pressure is the amount of pressure exerted on the walls of the blood vessels during the

a. period of rest between contractions

b. heart contraction

c. inhalation

d. diastole

_____ 2. If your blood pressure is 120/87, during the period of rest, the diastolic pressure is

a. 128

b. 87

c. 33 (128-87)

d. 129.87

_____ 3. If your blood pressure is 143/101, the systolic pressure is

a. 143

b. 101

c. 143/101

d. 32 (143-101)

May be photocopied for student use.

_____ 4. Heart rate is the number of heart beats per

a. second

b. minute

c. contraction

d. breath

_____ 5. Normal heart rate is

a. 60-100

b. 80-100

c. 60-80

d. 75-90

_____ 6. Heart rate can be influenced by all of the following EXCEPT

a. age

b. gender

c. blood pressure

d. body temperature

OBJECTIVE 4

Distinguish among structures of the blood vessels. Write an "A" in the blanks before statements about arteries; a "C" in the blanks before statements about capillaries; and a "V" in the blanks before statements about veins.

_____ 1. Have less muscle tissue than arteries

_____ 2. Carry blood from the pumping chambers (ventricles) to the organs

_____ 3. Have a single layer of cells that form a tube barely large enough to permit passage of blood cells

_____ 4. Are equipped with one-way valves that permit the blood to flow in only one direction

559

May be photocopied for student use.

_____ 5. Transport blood back to the heart under low pressure

_____ 6. Transport materials necessary to life of cells through walls into tissues; absorb tissue waste products through walls

_____ 7. Have the thickest walls of all blood vessels

OBJECTIVE 5 **Arrange in order steps in the process of blood circulation.** Write a "1" in the blank before the first step, a "2" in the blank before the second, etc.

Systemic (entire body)

_____ 1. At the other side of the capillaries, venules collect the deoxygenated blood cells.

_____ 2. Blood leaves the heart through the aorta.

_____ 3. Blood re-enters the heart at the right atrium, then begins pulmonary circulation.

_____ 4. At the point where food and oxygen are exchanged for waste products and carbon dioxide, arterioles become a network of capillaries.

_____ 5. Venules collect into larger veins.

_____ 6. From arteries, blood travels through smaller arterioles.

_____ 7. Veins lead to the inferior or superior vena cava which leads to the heart.

_____ 8. Blood in the left ventricle travels through the aortic semilunar valve into the aorta.

_____ 9. Blood is distributed throughout the body by traveling through arteries.

Pulmonary

_____ 1. From the arterioles, it flows through capillaries, where it exchanges carbon dioxide for oxygen.

_____ 2. Blood is pumped through the pulmonary semilunar valve and into the pulmonary artery.

_____ 3. The oxygenated blood enters the pulmonary vein and flows back to the heart.

May be photocopied for student use.

_____ 4. The deoxygenated blood flows through arterioles in the lungs.

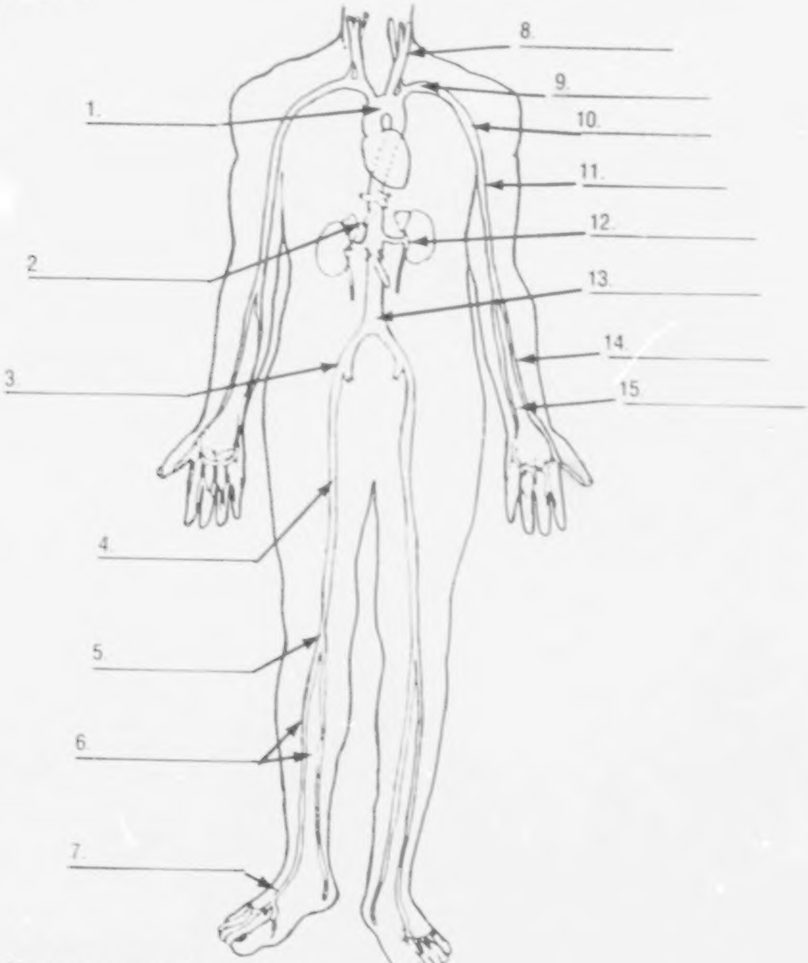
_____ 5. Capillaries collect into venules.

_____ 6. From the right atrium, blood travels through the tricuspid valve and into the right ventricle.

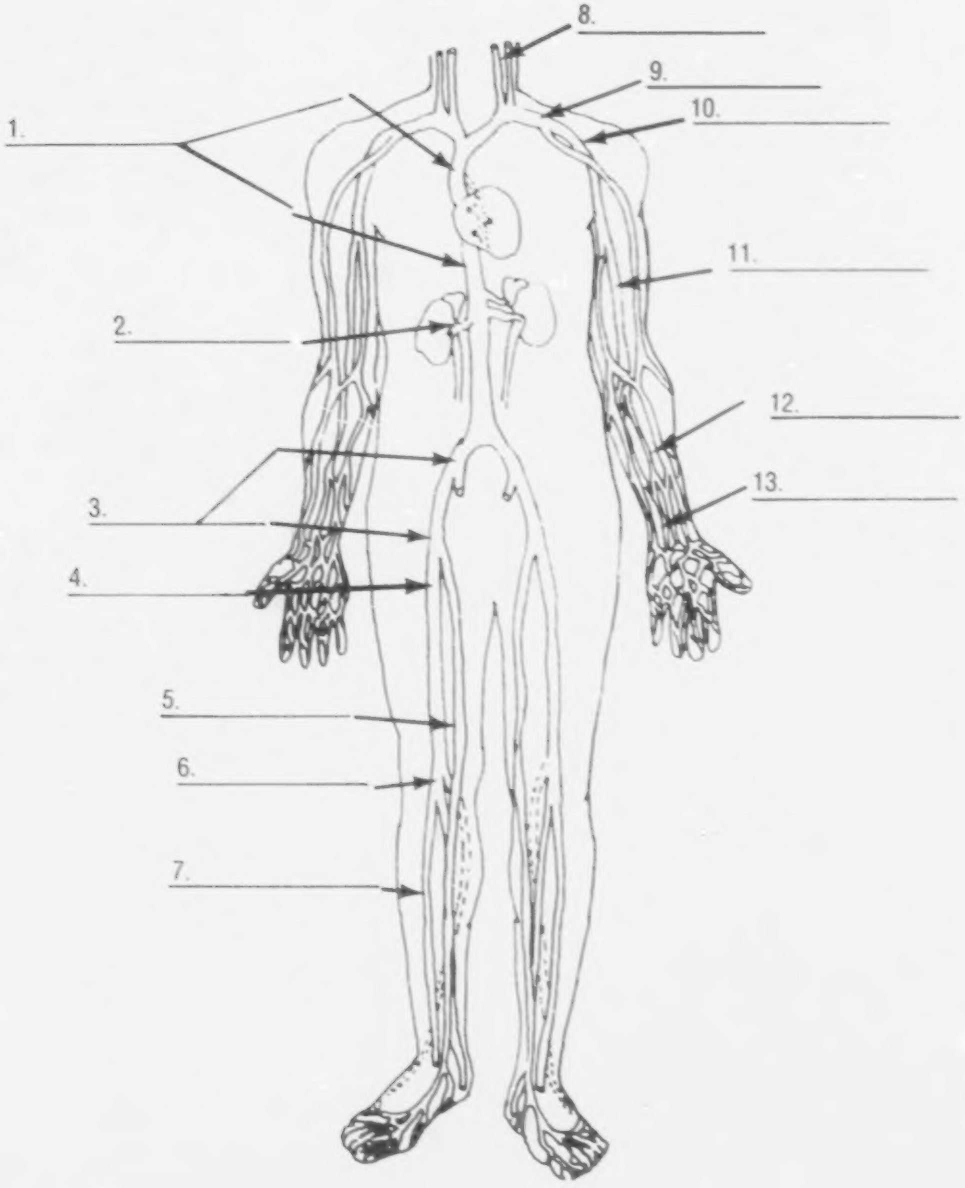
_____ 7. From the left atrium, blood flows through the bicuspid or mitral valve into the left ventricle and begins systemic circulation.

_____ 8. The now re-oxygenated blood enters at the left atrium.

OBJECTIVE 6 **Label the principal arteries and veins.** Write the name in the blank.

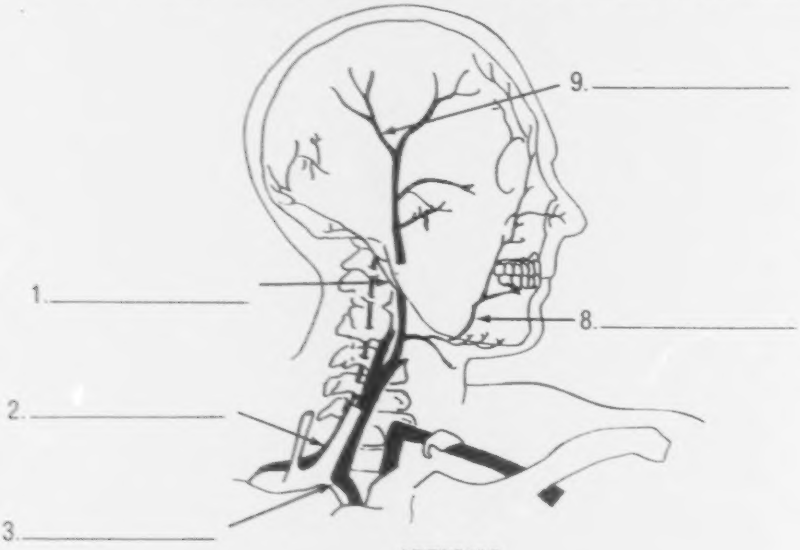


May be photocopied for student use

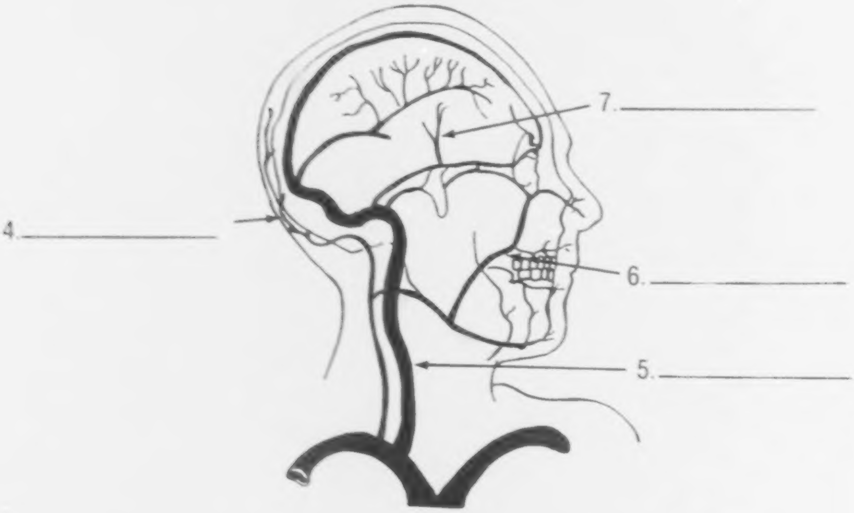

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.

May be photocopied for student use

OBJECTIVE 7 | **Label the cranial vessels.** Write the name in the blank.



ARTERIES



VEINS

OBJECTIVE 8 | **Arrange in order steps in the process of portal circulation.** Write a "1" in the blank before the first step, a "2" in the blank before the second, etc.

_____ 1. The portal vein carries the blood, loaded with digested food, to the liver.

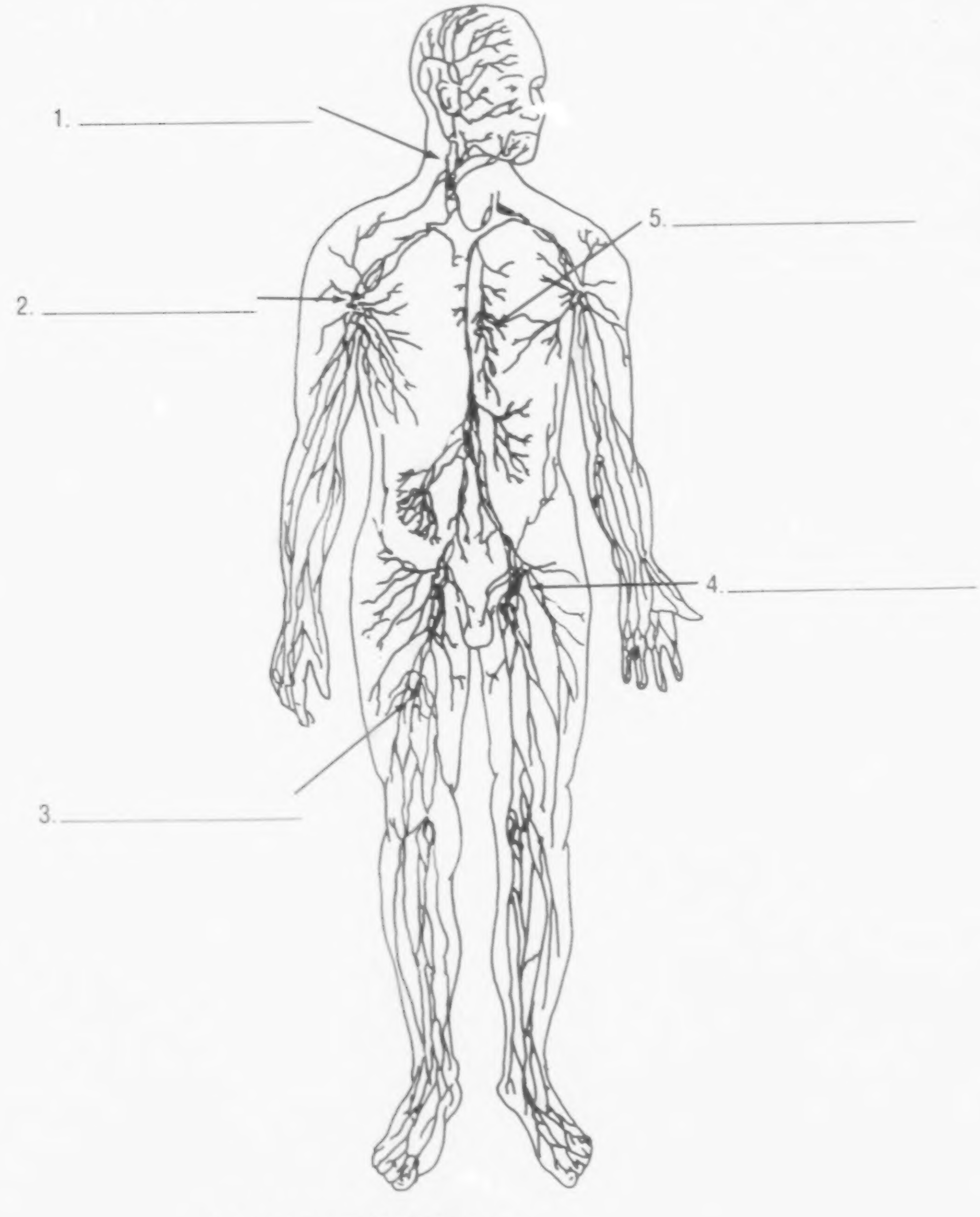
_____ 2. Vessels from the stomach, intestine, spleen, and pancreas empty into one vessel, the portal vein.

May be photocopied for student use.

_____ 3. Blood leaves the liver through the hepatic veins that empty into the inferior vena cava.

_____ 4. The liver extracts food materials for storage and modification and removes toxins.

OBJECTIVE 9 **Label the lymph nodes.** Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 10 **Choose the word or phrase that completes statements about the lymphatic system.** Write the letter in the blank.

_____ 1. Organs formed of lymph tissue include the tonsils, adenoids, and

a. milk ducts

b. appendix

c. spleen

d. liver

_____ 2. A network of very small lymph capillaries collect excess tissue fluid and

a. waste products

b. enzymes

c. gasses

d. formed elements

_____ 3. Lymph fluid resembles plasma in composition, but contains less

a. oxygen

b. protein

c. water

d. fat

_____ 4. Lymph capillaries empty into larger vessels and finally drain into the thoracic duct and the

a. superior lymphatic duct

b. left lymphatic duct

c. right lymphatic duct

d. inferior lymphatic duct

May be photocopied for student use.

_____ 5. The flow of lymph is slow and is aided by muscular contractions and by

a. valves that keep it from flowing backwards

b. enzymes that thin it, allowing it to flow more easily

c. gravity

d. body heat that thins the fluid

OBJECTIVE 11 **Select from a list functions of the spleen.** Write an "X" in the blank before each correct function.

_____ 1. Destroys bacteria

_____ 2. Balances pH levels in the bloodstream

_____ 3. Manufactures lymphocytes

_____ 4. Produces antibodies

_____ 5. Regulates heartbeats.

NOTE: Objective 12 is evaluated on job sheet/assignment sheet in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use

566

WRITTEN TEST ANSWERS

THE CIRCULATORY SYSTEM X

OBJECTIVE 1

Part I		Part II	
1. f	6. i	1. c	6. d
2. g	7. k	2. m	7. f
3. j	8. h	3. a	8. o
4. e	9. n	4. l	9. n
5. b	10. d	5. e	10. g

OBJECTIVE 2

3, 4, 6, 8, 9

OBJECTIVE 3

1. b
2. b
3. a
4. b
5. a
6. c

OBJECTIVE 4

1. V
2. A
3. C
4. V
5. V
6. C
7. A

OBJECTIVE 5

Systemic

1. 6
2. 2
3. 9
4. 5
5. 7
6. 4
7. 8
8. 1
9. 3

Pulmonary

1. 4
2. 2
3. 6
4. 3
5. 5
6. 1
7. 8
8. 7

OBJECTIVE 6

Arteries

1. Aorta
2. Mesenteric
3. Iliac
4. Femoral
5. Popliteal
6. Tibial
7. Dorsal pedis
8. Carotid
9. Subclavian
10. Axillary
11. Brachial
12. Renal
13. Abdominal aorta
14. Radial
15. Ulnar

Veins

1. Vena cave
(superior and inferior
2. Renal
3. Iliac
4. Femoral
5. Saphenous
6. Popliteal
7. Tibial
8. Jugular
9. Subclavian
10. Axillary
11. Brachial
12. Radial
13. Ulnar

OBJECTIVE 7

1. Occipital
2. Vertebral
3. Carotid
4. Temporal
5. Facial
6. Occipital
7. Temporal
8. Facial
9. Jugular

OBJECTIVE 8

1. 2
2. 1
3. 4
4. 3

OBJECTIVE 9

1. Cervical
2. Axillary
3. Femoral
4. Thoracic
5. Inguinal

OBJECTIVE 10	1. c 2. a 3. b 4. c 5. a
OBJECTIVE 11	1, 3, 4

570

OBJECTIVE SHEET

THE RESPIRATORY SYSTEM

XI

INTRODUCTION

From the moment of birth, your respiratory system works with the heart and circulatory system to distribute needed oxygen throughout your body. The importance of the respiratory system has been recognized as medicine has grown. Breathing techniques have been part of yoga and aerobics. Vapors and other inhaled medicines were among the first known to man. Today, medicine uses medicated inhalants and specially mixed or cleaned atmospheres. Preventive care of the system is becoming more important as a tool to combat indoor and outdoor pollutants and health-endangering habits such as smoking.

UNIT OBJECTIVE

After completing this unit the student will be able to identify the structures and functions associated with the respiratory system. The student will demonstrate these competencies by completing an assignment sheet and written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit the student will be able to:

1. Match terms associated with the respiratory system to their definitions.
2. Label structures of the respiratory system.
3. Select from a list true statements about structures of the nasal cavities.
4. Select from a list functions of the nasal cavities.
5. Match sections of the pharynx to their descriptions.
6. Distinguish between functions of the pharyngeal and laryngeal structures.
7. Complete statements about structures of the bronchi.
8. Distinguish between functions of the bronchi and bronchial structures and the trachea.
9. Choose the word or phrase that completes statements about characteristics of the lung.

10. Describe the mechanisms of breathing.

11. Communicate about how the respiratory system works. (Assignment Sheet)

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also, decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Order materials to supplement the unit. Three-dimensional models and a lung volume kit may be ordered from Opportunities for Learning, Inc., 941 Hickory Lane, Department XN, P.O. Box 8103, Mansfield, Ohio 44901-8103, 1-419-589-1700.
- Invite an allergist, respiratory therapist, or ENT to discuss the characteristics of the respiratory system.
- **HOSA** Integration
    - Assist students in conducting a chapter service project related to the unit information.
    - Develop objectives for the service project, identify a theme, and set a time line.
    - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
    - Arrange for photographs of all public speaking, presentations, or other public contact.
    - Host terminology and spelling contests.
    - Assist students in scheduling and presenting prepared and extemporaneous speeches.

- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.

- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.

- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the respiratory system to their definitions.

- Review prefix and suffix use. Identify prefixes and suffixes in the terms in Objective 1.

- Some terms used in this unit were also used in other units. This is particularly true of names of structures. Remind students of previous use of the terms, and have students relate the respiratory system to previous instruction.

Objective 2: Label structures of the respiratory system.

- Present a variety of illustrations from a variety of viewpoints.

- Use overlays to illustrate the relationships between the heart and lungs, the ribs and lungs, and the diaphragm and the lungs.

Objectives 3: Select from a list true statements about structures of the nasal cavities.

Objective 4: Select from a list functions of the nasal cavities.

- Review nasal cavities as discussed in Unit 5, The Skeletal System.

- Relate the role of the sinuses to common items such as kitchen strainers or air conditioning filters. Compare them to the entry systems found in many stores today, in which two sets of doors are separated by an enclosed space. In this space, temperature of outside air is regulated and outside dust and dirt can be trapped before entering the store.

Objectives 5: Match sections of the pharynx to their descriptions.

Objective 6: Distinguish between functions of the pharyngeal and laryngeal structures.

- Have students list all the functions of the throat before beginning the objective. Have them note what functions may affect other functions and how.

- Have the students list the functions of each structure as they label them.

Objectives 7: Complete statements about structures of the bronchi.

Objective 8: Distinguish between functions of the bronchi and bronchial structures and the trachea.

- Most classes will include at least one student with asthma or other bronchial conditions. Discuss how these common diseases work. Television commercials will have educated students to some degree.

- To illustrate why the term "bronchial tree" is used, have students turn the illustrations upside down and note similarities. From there, compare the way a tree "breathes in" through leaves, and distributes to roots with our breathing mechanisms.

Objective 9: Choose the word or phrase that completes statements about characteristics of the lung.

- Show examples of healthy and unhealthy lungs and have students note the differences.

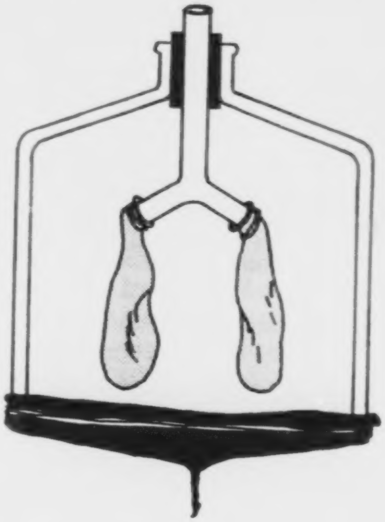
- Relate the location and functions of the heart to the lobes of the lungs.

Objective 10: Describe the mechanisms of breathing.

- Have students put their hands on their ribs as they breathe and describe what they feel happening.

- Demonstrate the structure and function of the pleura by rubbing two layers of plastic wrap together. Then lubricate the plastic with a small amount of mineral oil and rub together. Discuss the lack of friction as the two parts (lung and chest wall) move against each other during expansion.

- Use a simulated lung, as shown below, to demonstrate inhalation and exhalation. In this experiment, the balloons represent the lungs, the y-tube represents the trachea and bronchi, the sides of the glass bell jar represent the chest wall, the inside of the jar represents the thoracic cavity, and the piece of rubber covering the bottom of the bell jar represents the diaphragm. In the picture below, representing exhalation, the diaphragm (sheet of rubber) is relaxed so the lungs (balloons) are deflated. To show inhalation, pull down on the diaphragm (piece of rubber) to inflate the lungs (balloons).



OBJECTIVE 11: Communicate about how the respiratory system works.

- Have students complete the Assignment Sheet.
- Use the Assignment Sheet to meet HOSA integration guidelines.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700.

  Anatomy and Physiology Filmstrips, The Respiratory System (Unit 9). Each unit includes a filmstrip, cassette, and instructor's guide.

  Human Systems Filmstrip Sets: Respiration in the Human Body. Filmstrip, cassette, student self-instruction booklet.

  Normal and Abnormal Breath Sounds, The Nurse's Book Society, Delran, New Jersey. The tape and text package covers various breath sounds.

  Understanding Lung Sounds, Steven Lehrer. The Nurse's Book Society, Delran, New Jersey. Tape and illustrated book. (60-minute cassette)

Print Media

- *Respiratory Care Handbook*, The Nurse's Book Society, Delran, New Jersey.
- Sexton, Dorothy L., *Nursing Care of the Respiratory Patient*. The Nurse's Book Society, Delran, New Jersey.

Software

- *The Human Body: An Overview*, Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700. Two disks, kit, and teacher's guide. Apple 48K.

UNIT REFERENCES

- Duncan, Betty, *Allied Health Careers*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma, 1987.
- Fong, Elizabeth, Elvira B. Ferris, and Esther G. Skelley, *Body Structures and Functions*, Delmar Publishers, Albany, New York, 1989.

- Milliken, Mary Elizabeth and Gene Campbell, *Essential Competencies for Patient Care*, the C.V. Mosby Company, St. Louis, 1985.

- Rogers Helen V., *Practical Nursing Volume 1*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma, 1981.

578

INFORMATION SHEET

THE RESPIRATORY SYSTEM XI

OBJECTIVE 1

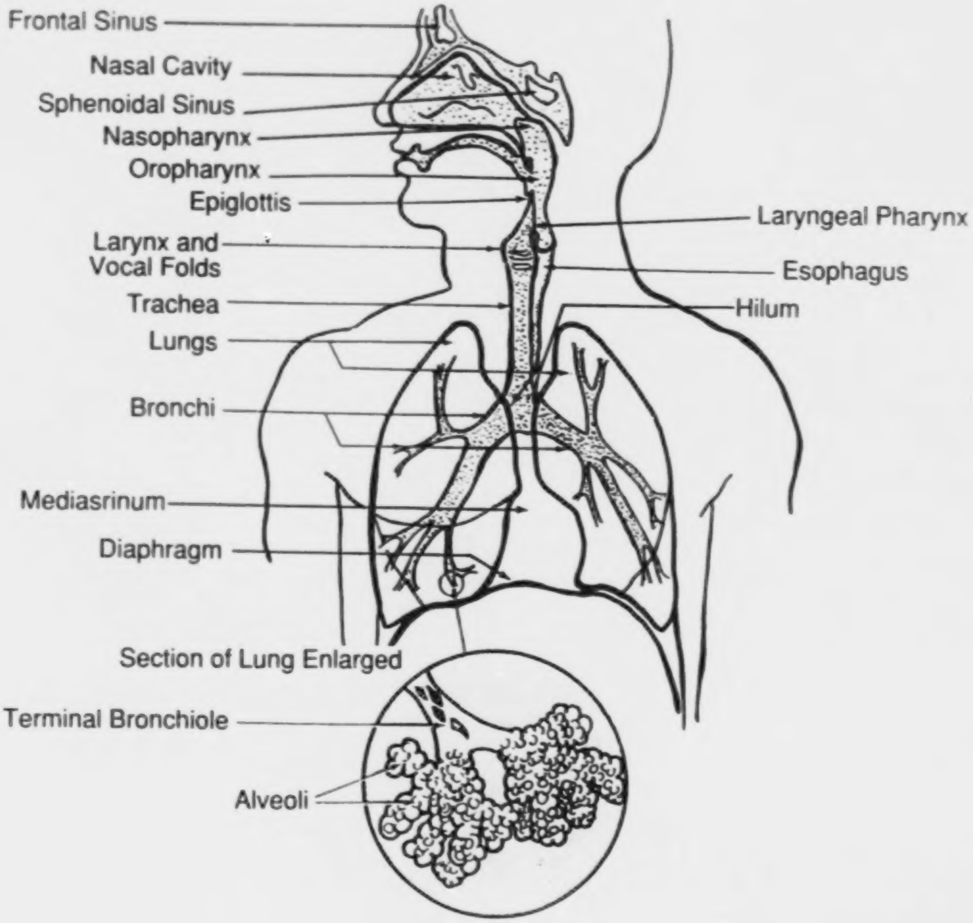
Match terms associated with the respiratory system to their definitions.

- **adenoids** – masses of lymphoid tissue found in the nasopharynx
- **breathing** – alternate inspiration and expiration of air that supplies oxygen to tissue cells and removes the gaseous waste product, carbon dioxide
- **cilia** – hairlike processes projecting from epithelial cells in the nasal passages and bronchial structures
- **eustachian tubes** – passageways that connect the middle ear with the pharynx
- **expiration** – expulsion of air from the lungs
- **hilum** – a depression or recess at the exit or entrance of a duct, nerve, or vessel into a gland
- **inspiration** – drawing of air into lungs
- **larynx** – voice box
- **pharynx** – muscular passageway (throat) for food and liquids into the esophagus and for air into the lungs
- **respiration** – exchange of oxygen (O_2) and carbon dioxide (CO_2) in the body

  NOTE: There are two kinds of respiration. One is the external, or lung-breathing, that takes place when the exchange of oxygen for carbon dioxide occurs within the alveoli of the lungs. The second is known as internal, or cell-breathing, that takes place when the exchange of oxygen for carbon dioxide occurs within the cells.

- **sac** – cavity or pouch; bag-like part of an organ
- **sinuses** – eight cavities in the skull connected with the nasal cavities
- **tonsils** – masses of lymphoid tissue found in the oropharynx
- **trachea** – the tube from the larynx to the bronchial tubes

OBJECTIVE 2 | **Label structures of the respiratory system.**


Frontal Sinus
Nasal Cavity
Sphenoidal Sinus
Nasopharynx
Oropharynx
Epiglottis
Larynx and Vocal Folds
Trachea
Lungs
Bronchi
Mediasrinum
Diaphragm
Section of Lung Enlarged
Terminal Bronchiole
Alveoli
Laryngeal Pharynx
Esophagus
Hilum

580

OBJECTIVE 3

Select from a list true statements about structures of the nasal cavities.

- Two spaces (nasal cavities) are separated by a partition (nasal septum).
- Three small bones, the turbinates or conchae, project into each nasal cavity.
- Nasal cavities are lined with a ciliated mucous membrane.

OBJECTIVE 4

Select from a list functions of the nasal cavities.

- Traps foreign bodies, such as dust particles and bacteria, which are filtered out by the cilia or caught on the surface of the mucous membrane
- Warms and moistens air before it reaches the lungs
- Contains receptors for sense of smell

OBJECTIVE 5

Match sections of the pharynx to their descriptions.

NOTE: Pharynx is pronounced FAIR-inks.

- **nasopharynx** – upper portion containing the adenoids
- **oropharynx** – middle section behind the mouth containing the tonsils and the openings of the eustachian tubes
- **laryngeal pharynx** – lower section with openings to larynx and esophagus

OBJECTIVE 6

Distinguish between functions of the pharyngeal and laryngeal structures.

Pharyngeal structures

- Pharynx serves as a passageway for food, fluids, and air.
- Adenoids and tonsils serve as filters for microorganisms and other foreign substances.
- Eustachian tubes equalize the pressure in the middle ear.

Laryngeal structures

The larynx (LAIR-inks) is made up of cartilage and is held together by ligaments. The upper end contains the vocal cords, two triangular-shaped membranous folds which extend from front to back. Entrance to the larynx is protected by the epiglottis.

- Larynx serves as a passageway for air only
- Vocal cords produce sound (voice)
- Epiglottis prevents food from entering the larynx and trachea.

OBJECTIVE 7

Complete statements about structures of the bronchi.

- The trachea enters the chest cavity and divides into two smaller tubes, the left and right bronchus.
- As the bronchi enter the lungs at the hilum, they divide into smaller branches, forming the bronchial tree.
- The smallest branches, the bronchioles, have walls composed of smooth muscle and a lining of mucous membrane.
- At the end of each bronchiole there is a cluster of air sacs, resembling a bunch of grapes, known as the alveoli.
- Each air sac, alveolus, is lined with epithelium, one cell-layer thick and surrounded by a capillary network.

OBJECTIVE 8

Distinguish between functions of the bronchi and bronchial structures and the trachea.

Bronchi and bronchial structures

- Passageway of oxygen to alveoli
- Exchange of gases (oxygen and carbon dioxide)

Trachea

The trachea is a ciliated, mucous-lined tube with a cartilage framework extending from the larynx to the bronchi.

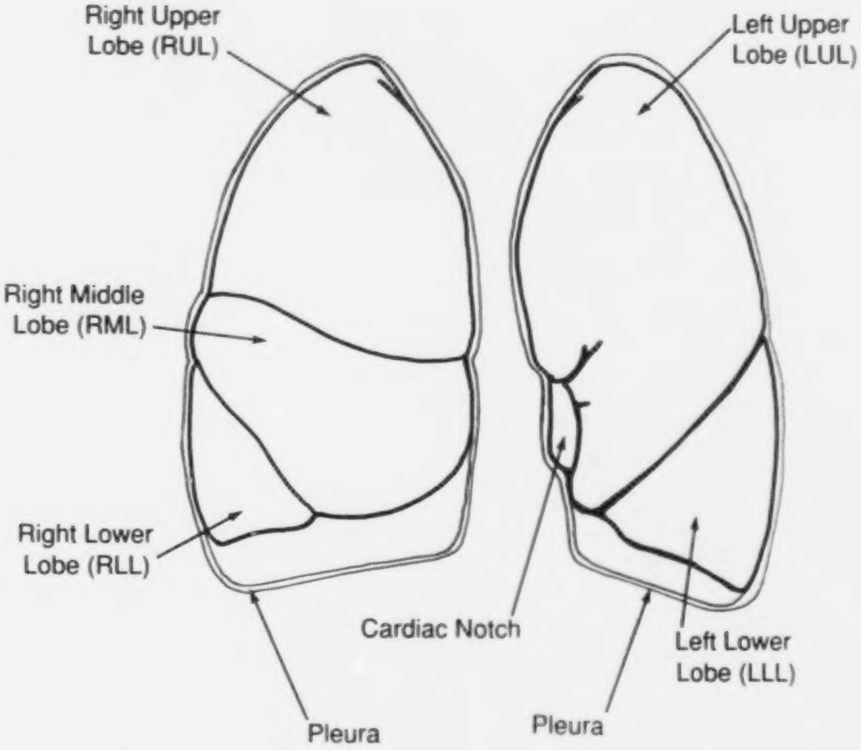
- Conduction of air to and from lungs
- Transportation of inhaled foreign particles out of body by cilia

OBJECTIVE 9

Choose the word or phrase that completes statements about characteristics of the lung.

The lungs are two cone-shaped organs that nearly fill the chest cavity. The top of the lung is called the apex; the lower, wider portion that fits over the diaphragm is called the base. Lungs are made of spongy tissue filled with alveoli, nerves, and blood and lymph vessels. Lungs are divided into sections called lobes. The right lung has three lobes, the left has two. Each lung is covered with a smooth, double-layered sac, called pleura, which provides moisture to prevent friction during movement.

The pleura has an inner layer that covers the lung itself, called the visceral pleura. The outer layer, that lines the wall of the chest cavity, is the parietal pleura. There is a potential space between the two layers that, through accident or illness, can become filled with air or fluid.


Right Upper Lobe (RUL)
Left Upper Lobe (LUL)
Right Middle Lobe (RML)
Right Lower Lobe (RLL)
Cardiac Notch
Left Lower Lobe (LLL)
Pleura
Pleura

OBJECTIVE 10

Describe the mechanisms of breathing.

- Lungs do not move by themselves during the process of breathing; they are inflated and deflated by the muscles that surround them.

- A person can control his or her breathing for a time, but breathing is usually an automatic process. It is controlled by the respiratory center of the brain, located in the medulla, immediately above the spinal cord.

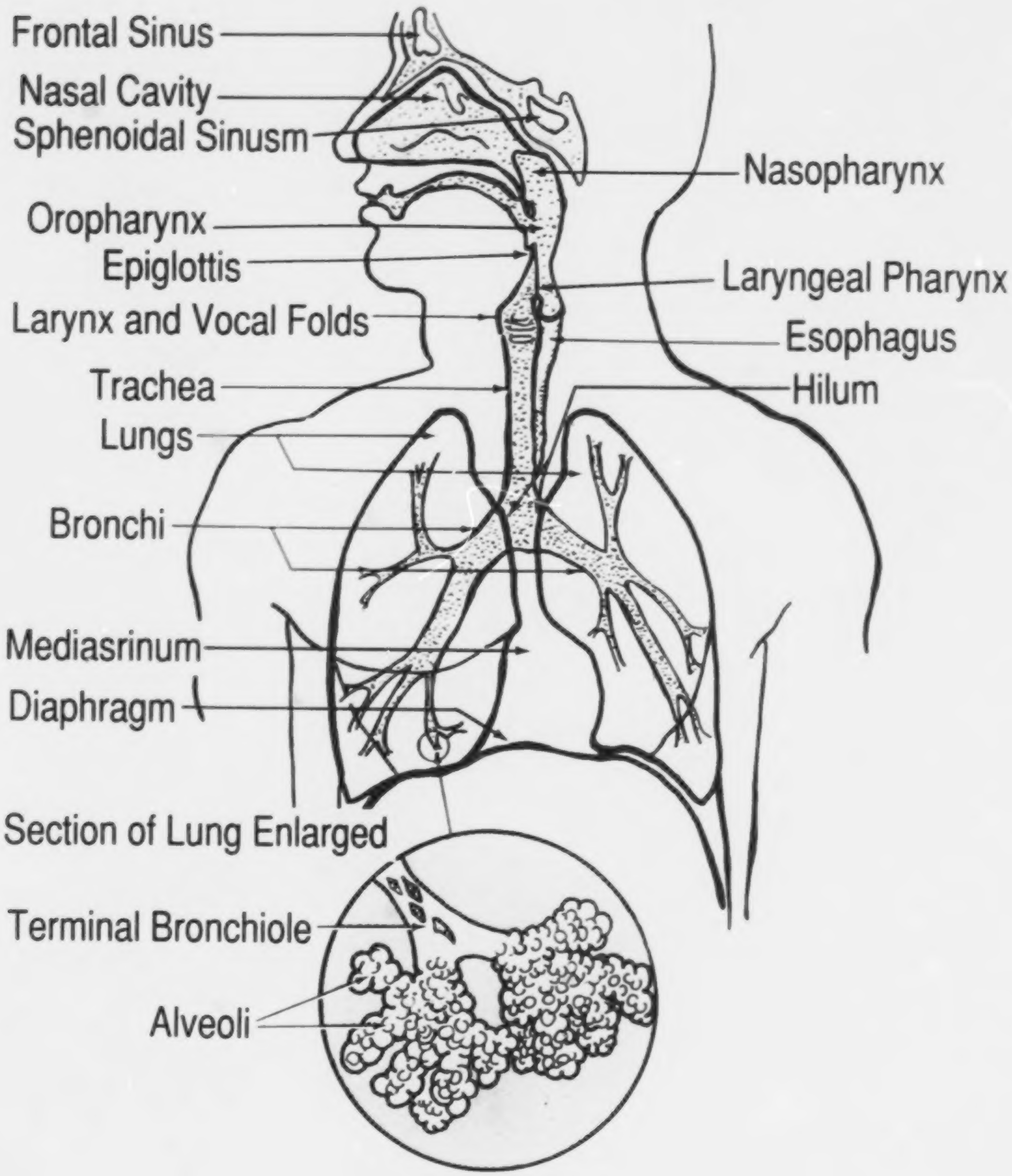
- There are two steps to the breathing process:

  - Inspiration: The diaphragm and the intercostal muscles contract, creating a vacuum, and air rushes in to inflate the lungs.

  - Expiration: Diaphragm and intercostal muscles relax, the lungs are compressed, and air flows out.

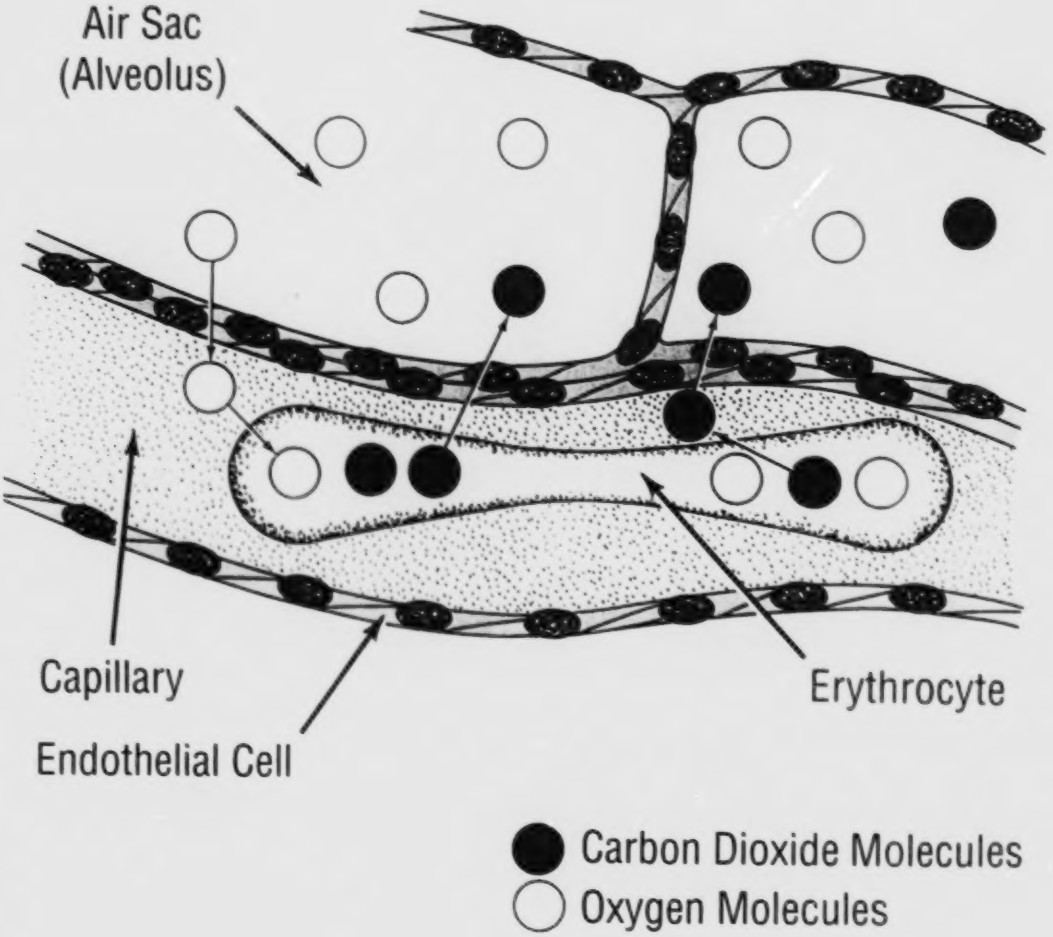
- The range of normal respiration rate is 14-20 breaths per minute.

The Respiratory Tract


Frontal Sinus
Nasal Cavity
Sphenoidal Sinusm
Oropharynx
Epiglottis
Larynx and Vocal Folds
Trachea
Lungs
Bronchi
Mediasrinum
Diaphragm
Section of Lung Enlarged
Terminal Bronchiole
Alveoli
Nasopharynx
Laryngeal Pharynx
Esophagus
Hilum

TM 2

Diffusion of Oxygen and Carbon Dioxiode


Air Sac
(Alveolus)
Capillary
Endothelial Cell
Erythrocyte
● Carbon Dioxide Molecules
○ Oxygen Molecules

ACTIVITY SHEET

Development of:
READING SKILLS
SCIENCE SKILLS

- Introduce the assignment to the students by discussing why reading and science skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Interpret graphics and symbols

  SCIENCE SKILLS

  - Investigate/apply principles of anatomy/physiology

- If students have difficulty interpreting graphics and symbols:

  - Remind them that interpreting a graphic is very similar to reading a page. Each part of the graphic or symbol has a meaning within the art.

  - Suggest that, when they have a graphic, chart, diagram, or table to interpret, they should carefully study the art and compare it to any similar pieces encountered. Also study the key or any other information that will help you understand the meaning of the graphic.

- If students have difficulty investigating/applying the principles of anatomy/physiology, remind them that it is important in any area of work or study to have consistent ideas or principles that everyone uses. Explain that sometimes it is necessary to express these in graphic format so that it will be easy for people to relate them to the body.

Functional Reading Skills

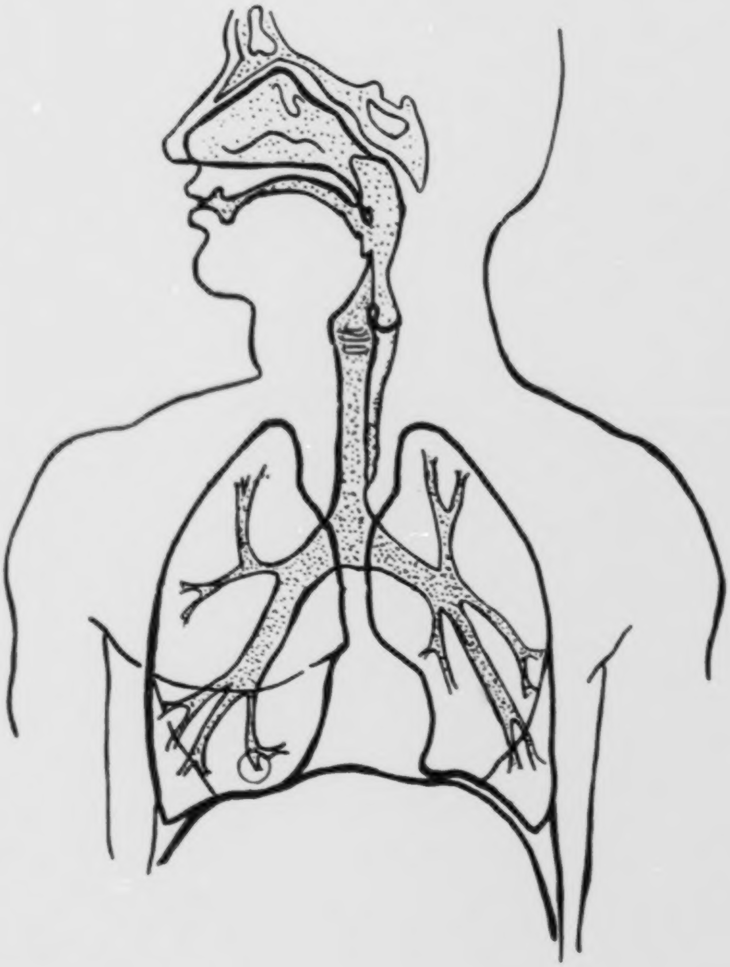
- Interpret graphics & symbols (charts, diagrams, graphs, signs, etc.)

Life Science Skills

- Investigate/apply principles of anatomy/physiology

TRACE A BREATH

Use the diagram below to trace the route of a breath of air. Color the path of the air and use arrows to indicate the direction of the air.



ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization

  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language

  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing effective leadership

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:
  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.
  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.
- If students have difficulty adapting their presentation to a specific audience:
  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.
  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.
- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.
- If students have difficulty developing effective leadership:
  - Have the class discuss traits that make a person an effective leader.

- Remind the students that an effective leader does not boss people needlessly or order other people to do his or her work–an effective leader is a person who can get a task finished by combining his or her talents with the talents of the other people to best complete a project. It is a person who can both suggest ideas and listen openly to the ideas of others. It is a person who can make an educated decision when necessary to the success of the project.

- Provide students with opportunities to develop leadership skills by dividing the class into groups to plan and complete the assignment sheet activity or any other appropriate activity.

- Work with the groups to ensure that each student has the opportunity and the information needed to lead one phase of the assignment.

ASSIGNMENT SHEET

THE RESPIRATORY SYSTEM

XI

Name ______________________________ Score __________

OBJECTIVE 11

Communicate about how the respiratory system works.

INTRODUCTION

Because our lungs are exposed to many things in the atmosphere from pollen and other allergens, to bacteria and viruses, and pollutants and smoke, it is important to understand how the respiratory system works. Understanding how it works will make it easier for us to do the things necessary to keep it functioning efficiently.

DIRECTIONS

Create a poster, pamphlet, brochure, present an oral report, or skit on how the respiratory system works. Present the project to your class.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (written, oral, practical)

Job Acquisition/ Development Skills
- Develop effective leadership

THE RESPIRATORY SYSTEM

The assignment should be completed with up-to-date information. Proper grammar and punctuation should be used. HOSA guidelines should be met.

WRITTEN TEST

THE RESPIRATORY SYSTEM

XI

Name ______________________________ Score __________

OBJECTIVE 1

Match terms associated with the respiratory system to their definitions. Write the correct letters in the blanks.

Part I

_____ 1. Drawing of air into lungs

_____ 2. Voice box

_____ 3. Hairlike processes projecting from epithelial cells in the nasal passages and bronchial structures

_____ 4. Exchange of oxygen (O_2) and carbon dioxide (CO_2) in the body

_____ 5. Masses of lymphoid tissue found in the nasopharynx

_____ 6. Eight cavities in the skull connected with the nasal cavities

_____ 7. Masses of lymphoid tissue found in the oropharynx

a. adenoids
b. cilia
c. expiration
d. inspiration
e. larynx
f. pharynx
g. respiration
h. sac
i. sinuses
j. tonsils

May be photocopied for student use.

Part II

_____ 1. Muscular passageway (throat) for food and liquids into the esophagus and for air into the lungs

_____ 2. Passageways that connect the middle ear with the pharynx

_____ 3. Expulsion of air from the lungs

_____ 4. A depression or recess at the exit or entrance of a duct, nerve, or vessel into a gland

_____ 5. The tube from the larynx to the bronchial tubes

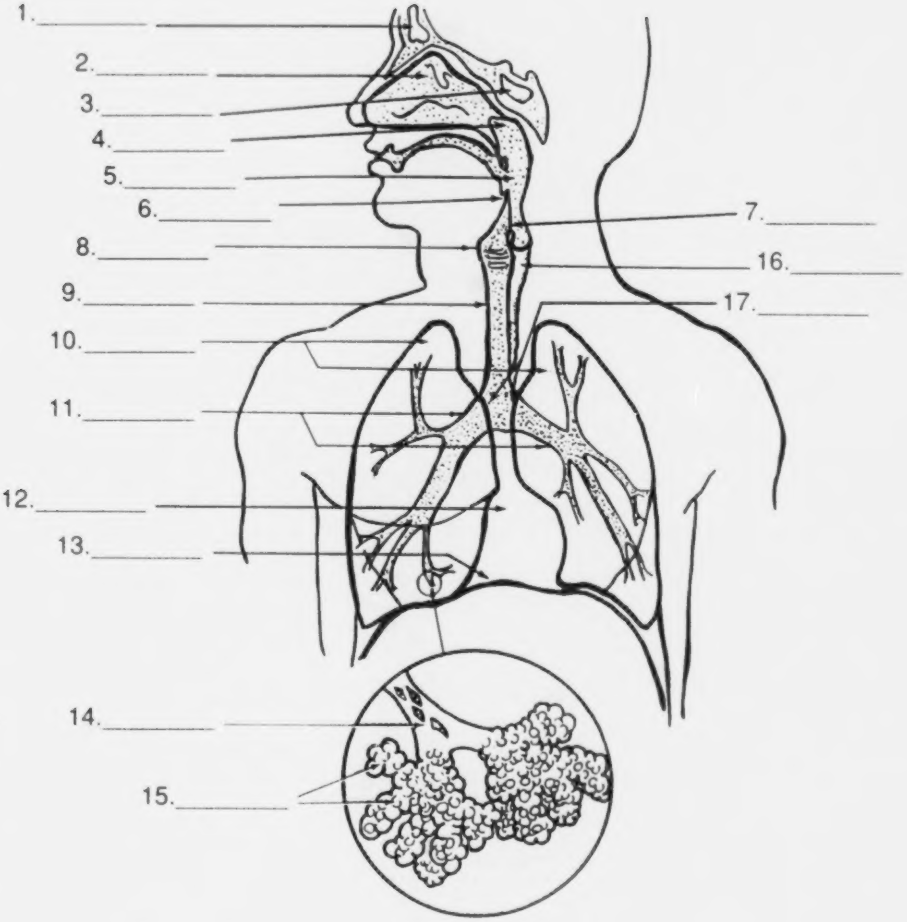
_____ 6. Cavity or pouch; bag-like part of an organ

_____ 7. Alternate inspiration and expiration of air that supplies oxygen to tissue cells and removes the gaseous waste product, carbon dioxide

a. breathing
b. eustachian tubes
c. expiration
d. hilum
e. inspiration
f. larynx
g. pharynx
h. sac
i. trachea
j. vocal cords

May be photocopied for student use.

OBJECTIVE 2 | Label structures of the respiratory system.


1.
2.
3.
4.
5.
6.
7.
8.
16.
9.
17.
10.
11.
12.
13.
14.
15.

May be photocopied for student use.

OBJECTIVE 3 **Select from a list true statements about structures of the nasal cavities.** Write an "X" in the blanks before true statements.

_____ 1. The nasal septum is a partition that separates nasal cavities.

_____ 2. The largest cavity is the nasal septum.

_____ 3. Three small bones, the turbinates or conchae, project into each nasal cavity.

_____ 4. The nasal septum is connected to the skull by conchae and turbinates.

_____ 5. The two types of cavities are conchae and turbinates.

OBJECTIVE 4 **Select from a list functions of the nasal cavities.** Write an "X" in the blank before functions of the nasal cavities.

_____ 1. Traps foreign bodies

_____ 2. Maintains internal air pressure

_____ 3. Maintains body temperature

_____ 4. Warms air

_____ 5. Smells

_____ 6. Moistens air

OBJECTIVE 5 **Match sections of the pharynx to their descriptions.** Write the correct letter in the blank

_____ 1. Upper portion containing the adenoids

_____ 2. Middle section behind the mouth containing the tonsils and the openings of the eustachian tubes

_____ 3. Lower section with openings to larynx and esophagus

a. esophageal pharynx

b. laryngeal pharynx

c. nasopharynx

d. oropharynx

e. sinopharynx

May be photocopied for student use.

OBJECTIVE 6

Distinguish between functions of the pharyngeal and laryngeal structures. Write a "P" in the blanks before pharyngeal structure function and an "L" before laryngeal structure function.

_____ 1. Epiglottis prevents food from entering the larynx and trachae

_____ 2. Serves as a passageway for air only

_____ 3. Adenoids and tonsils serve as filters for microorganisms and other foreign substances.

_____ 4. Produces sound (voice)

_____ 5. Eustachian tubes equalize the pressure in the middle ear.

_____ 6. Serves as passageways for food, fluids, and air

OBJECTIVE 7

Complete statements about structures of the bronchi. Write the correct work in the blank.

1. The ____________ enters the chest cavity and divides into ________ smaller tubes.
2. As the bronchi enter the lungs at the ________________ they divide into smaller branches.
3. Bronchioles have walls composed of smooth ______________ and a lining of mucous membrane.
4. At the end of each bronchiole is a cluster of ______________ ____________ know as the alveoli.

May be photocopied for student use.

OBJECTIVE 8

Distinguish between functions of the bronchi and bronchial structures and the trachea. Write a "B" in the blank before statements about bronchi and bronchial structures and a "T" in the blank before statements about the trachea.

_____ 1. Transportation of inhaled foreign particles out of body by cilia

_____ 2. Passageway of oxygen to alveoli

_____ 3. Conduction of air to and from lungs

_____ 4. Exchange of gases (oxygen and carbon dioxide)

OBJECTIVE 9

Choose the word or phrase that completes statements about characteristics of the lung. Write the correct letter in the blank.

_____ 1. Lungs are made of spongy tissue filled with alveoli, nerves and

- a. blood and lymph vessels
- b. muscle fibers
- c. blood and muscle fibers
- d. lymph vessels

_____ 2. The right lung has three lobes: the left has

- a. two
- b. three
- c. four
- d. six

_____ 3. Lungs are covered with a smooth double-layered sac, called

- a. epidural sac
- b. pleura
- c. pleural sac
- d. epidural

May be photocopied for student use.

600

_____ 4. The inner layer of the pleura is called the

- a. potential space
- b. parietal pleura
- c. visceral pleura
- d. cardiac pleura

_____ 5. The outer layer of the pleura is called the

- a. potential space
- b. parietal pleura
- c. visceral pleura
- d. cardiac pleura

_____ 6. The potential space between the two layers can become filled with

- a. blood or air
- b. blood or fluid
- c. fluid or tissue
- d. fluid or air

OBJECTIVE 10 **Describe the mechanisms of breathing.**

1. How is expiration performed?

____

____

____

2. How is inspiration performed?

____

____

____

May be photocopied for student use.

3. How is breathing controlled?

NOTE: Objective 11 is evaluated on job sheets/assignment sheet in this unit. If you have not completed these components, see your instructor

May be photocopied for student use.

WRITTEN TEST ANSWERS

THE RESPIRATORY SYSTEM

XI

OBJECTIVE 1

Part I		Part II	
1.	d	1.	g
2.	e	2.	b
3.	b	3.	c
4.	g	4.	d
5.	a	5.	i
6.	i	6.	h
7.	j	7.	a

OBJECTIVE 2

1. frontal sinus
2. nasal cavity
3. sphenoidal sinus
4. nasopharynx
5. oropharynx
6. epiglottis
7. laryngeal pharynx
8. larynx and vocal cords
9. trachea
10. lungs
11. bronchi
12. mediastinum
13. diaphragm
14. terminal bronchiole
15. alveoli
16. esophagus
17. hilum

OBJECTIVE 3 1, 3

OBJECTIVE 4 1, 4, 5, 6

OBJECTIVE 5

1. c
2. d
3. b

OBJECTIVE 6

1. L
2. L
3. P
4. L
5. P
6. P

OBJECTIVE 7

1. trachea, two
2. hilum
3. muscle
4. air sacs

OBJECTIVE 8

1. T
2. B
3. T
4. B

OBJECTIVE 9

1. a
2. a
3. b
4. c
5. b
6. d

604

OBJECTIVE 10

Answers should include:

1. Expiration – diaphragm and intercostal muscles relax, the lungs are compressed, and air flows out.
2. Inspiration – the diaphragm and the intercostal muscles contract, creating a vacuum and air rushes in to inflate the lungs.
3. Lungs are inflated and deflated by the muscles that surround them.
4. Breathing is usually an automatic process controlled by the respiratory center of the brain.

OBJECTIVE SHEET

THE URINARY SYSTEM

XII

INTRODUCTION

As tissue is formed or maintained, as blood is circulated, and as body nutrients are digested, water is needed and waste is produced. The need for water is constant. Without it, the body cannot function. Waste, however, must be removed from the body. The urinary system serves these two basic functions: monitoring the body's fluid level/balance and excreting wastes.

There are four basic excretory systems. The skin or integumentary system excretes water, salts, and small quantities of nitrogenous wastes through perspiration. The respiratory system excretes water, carbon dioxide, and other gases through expiated gases. The digestive system excretes water, bile, salts, undigested food, mucus, and bacteria through feces. The urinary system excretes water, salts, and nitrogenous waste products through urine.

UNIT OBJECTIVE

After completing this unit the student will be able to identify the structures and functions of the urinary system, kidneys, and bladder. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the urinary system to their definitions.
2. Label structures of the urinary system.
3. Choose the word or phrase that completes statements about the location and structure of kidneys.
4. Select from a list functions of the kidneys.
5. Label parts of the kidney.
6. Match parts of the kidney to their descriptions.
7. Label parts of the nephron.
8. Match parts of the nephron to their descriptions.
9. Choose the word or phrase that completes statements about the function of nephrons.

10. Choose the word or phrase that completes statements about structures and functions of the ureter and the bladder.

11. Distinguish between the structure and function of the male and female urethra.

12. List terms that mean expelling urine.

13. Distinguish between normal and abnormal components of urine.

14. Choose the word or phrase that completes statements about characteristics of normal urine.

15. Select from a list functions of water in the body.

16. Select from a list ways the kidneys maintain homeostasis of the body.

17. Communicate about how the urinary system works. (Assignment Sheet)

THE URINARY SYSTEM

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Order materials to supplement the unit. Models may be ordered from Health Edco, P.O. box 21207, Waco, TX 76702-1207, 1-800-299-3366, FAX 1-817-751-0221.
- Invite a urologist to discuss characteristics of the urinary system.

  NOTE: Please provide the guest speaker with the specific topic relevant to the unit of instruction ahead of time. You may want to supply the Objective Sheet, Information Sheet and any other components you want covered. Confirm the scheduled appearance 2-3 days prior to the presentation.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.

- Assist students in scheduling and presenting prepared and extemporaneous speeches.
- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the urinary system to their definitions.

- Some terms, such as hilum, are repeated from previous units.
- Describe the location and function of organs as they are defined.

Objective 2: Label structures of the urinary system.

- Relate the urinary system to other systems, particularly the digestive and circulatory systems.
- Have students determine where their own kidneys, etc., are located.

Objective 3: Choose the word or phrase that completes statements about the location and structure of kidneys.

Objective 4: Select from a list functions of the kidneys.

- Have students suggest ways the kidneys are protected.
- How the kidney maintains water balance is covered in Objective 15.

Objective 5: Label parts of the kidney.

Objective 6: Match parts of the kidney to their descriptions.

- Discuss the function of the kidneys and their parts.
- Discuss how kidney infections affect kidneys.

- Students will probably be aware of kidney transfusions and dialysis. Discuss these procedures, invite a urologist to discuss them, or allow students to visit a dialysis clinic.

Objective 7: Label parts of the nephron.

Objective 8: Match parts of the nephron to their descriptions.

Objective 9: Choose the word or phrase that completes statements about the function of nephrons.

- Compare nephrons to the kidneys.

- Use the term "recycling" to explain the convoluted tubule and the substances returned for reabsorption.

- Compare capillary functions to those in the circulatory system.

- Use Transparency Master 3 to illustrate parts of the nephron.

Objective 10: Choose the word or phrase that completes statements about structures and functions of the ureter and the bladder.

- Show students how much fluid a bladder can hold by measuring 200-400 cc in a measuring cup.

- Discuss the spread of urinary infections from urethra, to bladder, to ureter, and finally to kidneys.

- Have students discuss the effect of pregnancy and aging on the urinary system.

Objective 11: Distinguish between the structure and function of the male and female urethra.

- Have students compare common urinary problems of men with those of women.

- Discuss the effects of the reproductive system on male and female urinary systems.

Objective 12: List terms that mean expelling urine.

- Students will probably be able to offer other synonyms for urination. These can be used to desensitize students, if necessary.

- Explain to students that these are correct, medical terms, but may not be useful in every situation. When dealing with a child, for example, "potty" or "wet" may be more useful.

Objectives 13: Distinguish between normal and abnormal components of urine.

Objective 14: Choose the word or phrase that completes statements about characteristics of normal urine.

- Discuss how each of these are determined and what is unusual.
- Allow students to test a sample of urine for color, odor, pH, and specific gravity.

Objective 15: Select from a list functions of water in the body.

- Have students suggest functions of water before covering the objective.
- Present signs of dehydration and relate them to functions of water.

Objective 16: Select from a list ways the kidneys maintain homeostasis of the body.

- Discuss how the kidney monitors electrolytes, osmolality of body fluids, volume of extracellular fluid, blood volume, and pH.

APPLICATION

Objective 17: Communicate about how the urinary system works.

- Use the Assignment Sheet to meet HOSA guidelines.
- Use the Assignment Sheet to introduce and stress prevention and healthy lifestyles.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.

- Reteach and retest if necessary.

- Complete appropriate section of competency profiles.

- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- The following are available from Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700.

  Anatomy and Physiology Filmstrips, Urinary System, Unit 11. Includes filmstrip with cassette and instructor's guide.

  Human Systems Filmstrips Set, Urinary System in the Human body, Urinary System, Unit 11. Includes filmstrip with cassette, student self-instruction, and script booklet. Covers pathways, structures, urine formation, and reabsorption.

Computer Software

- The following are available from Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700.

  Kidney Software Structure and Function. Sotfware covers filtration, reabsorption, urine formation, hormones, and other topics. Includes teacher's guide and student study sheets. For use on Apple II+ and IIe.

  The Body Transparent, Urinary System, Unit 11. Includes three options: "Body Assembly" covers organ placement in the male and female bodies; "Body Facts and Functions" covers organ and part identification; "Make Your Own Anatomy Game" allows teachers to program information for review and teaching games. For use on Apple 48K or IBM 64K.

UNIT REFERENCES

- *Allied Health Careers.* Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma, 1987.
- Rogers, Helen V. *Practical Nursing Volume 1*, Oklahoma Department of Vocational and Technical Education, 1981.
- Rosdahl, Caroline Bunker. *Textbook of Basic Nursing.* J.B. Lippincott Company, Philadelphia, 1981.

OBJECTIVE 1

Match terms associated with the urinary system to their definitions.

- **adrenal** – endocrine gland on the kidney
- **clitoris** – the erectile female organ at the anterior end of the labia minora
- **distention** – the state of being stretched out or overfilled

  NOTE: It is important to know when the bladder is distended from retention of urine and when the abdomen is distended due to flatulence or some other condition.

- **excretion** – removing useless substances (waste products of cell metabolism) from the blood and lymph
- **hepatic** – pertaining to the liver
- **hilum** – a depression or recess at the exit or entrance of a duct, nerve, or vessel into a gland
- **nephrology** – the study of the kidney

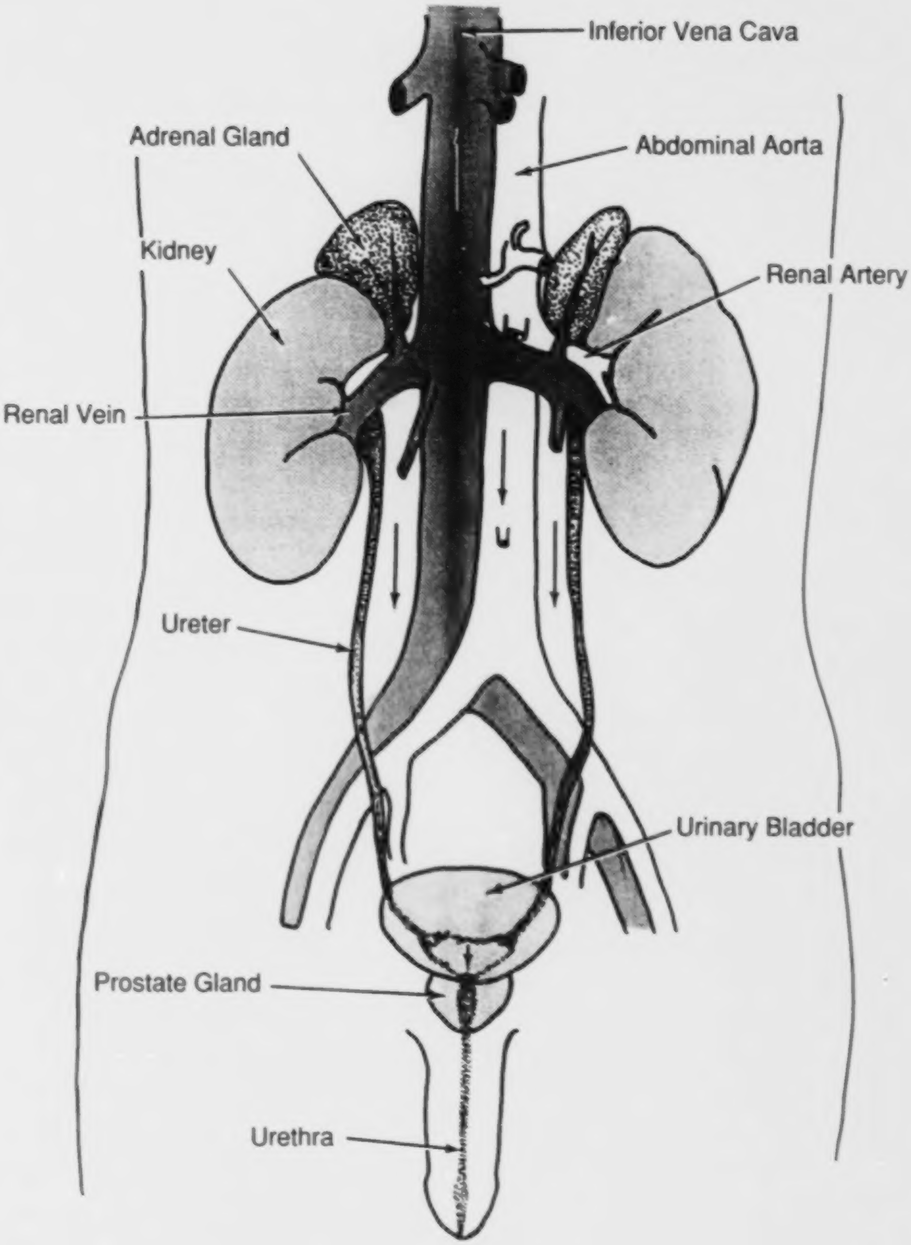
  NOTE: "Nephro-" means kidney.

- **nephron** – basic functional unit of the kidneys
- **osmolality** – osmotic concentration; the concentration of ions in a dissolved substance compared to the amount of solvent
- **prostate gland** – a donut-shaped, muscular gland surrounding the superior male urethra
- **renal** – pertaining to the kidney
- **secretion** – the process of giving off a specific product as a result of the activity of a gland
- **specific gravity** – the weight of a substance compared with an equal volume of water
- **urea** – the chief nitrogenous component of urine

  NOTE: In normal conditions urea represents 80-90 percent of total urinary nitrogen.

- **ureter** – the tube that carries urine from the kidney to the bladder
- **urethra** – the tube that carries urine from the bladder to the outside of the body
- **urinary casts** – fibrous material thrown off in various pathological conditions
- **urinary meatus** – external opening of the urethra
- **urology** – the study of the urinary system
- **vascular** – pertaining to or composed of blood vessels

OBJECTIVE 2 | **Label structures of the urinary system.**


Inferior Vena Cava
Adrenal Gland
Abdominal Aorta
Kidney
Renal Artery
Renal Vein
Ureter
Urinary Bladder
Prostate Gland
Urethra

OBJECTIVE 3

Choose the word or phrase that completes statements about the location and structure of kidneys.

- Kidneys are bean-shaped, reddish brown organs. They are embedded in fatty tissue and surrounded by a fibrous tissue called renal fascia.
- Kidneys lie against the muscles of the back under the dome of the diaphragm, protected somewhat by the ribs and their cartilages, and behind the peritoneum.
- Blood vessels and nerves enter the kidney at the hilum, and the ureter leaves the kidney at the hilum.

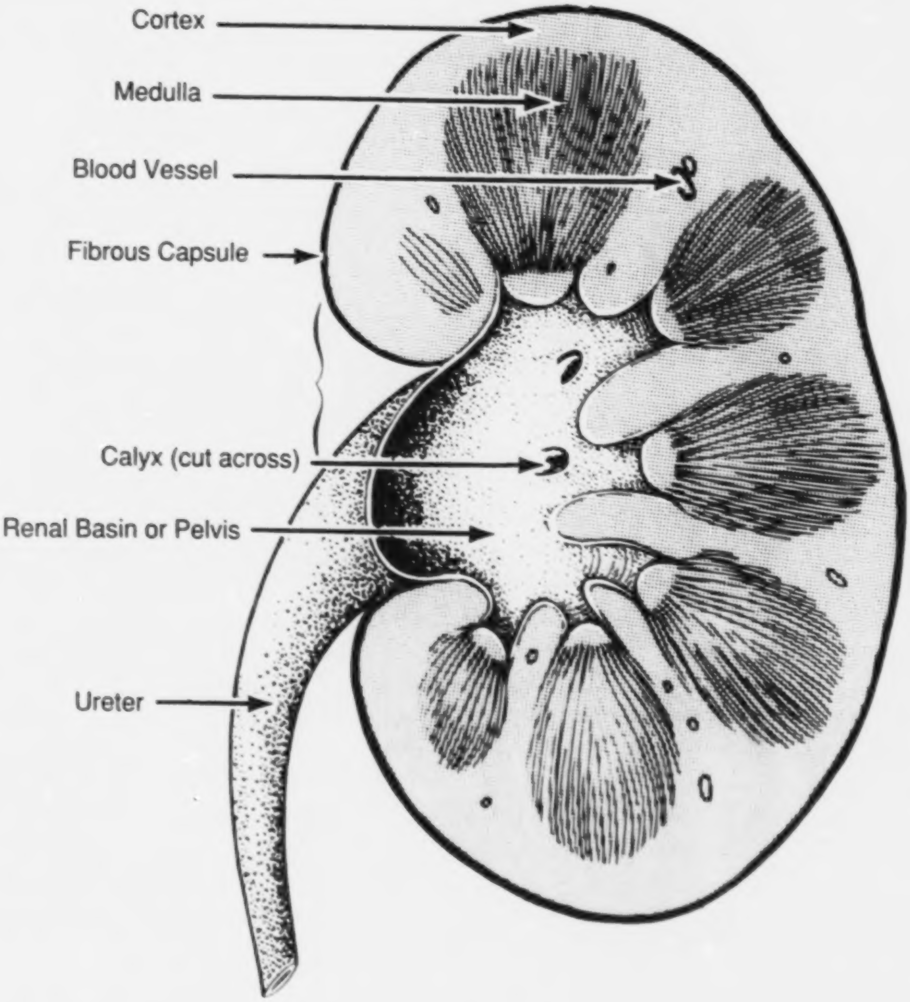
OBJECTIVE 4

Select from a list functions of the kidneys.

NOTE: The kidneys are also involved in regulating blood pressure and they stimulate production of red blood cells.

- Excretion of waste products
- Assistance in maintaining the water balance of the body
- Assistance in regulating the acid-base balance of the body

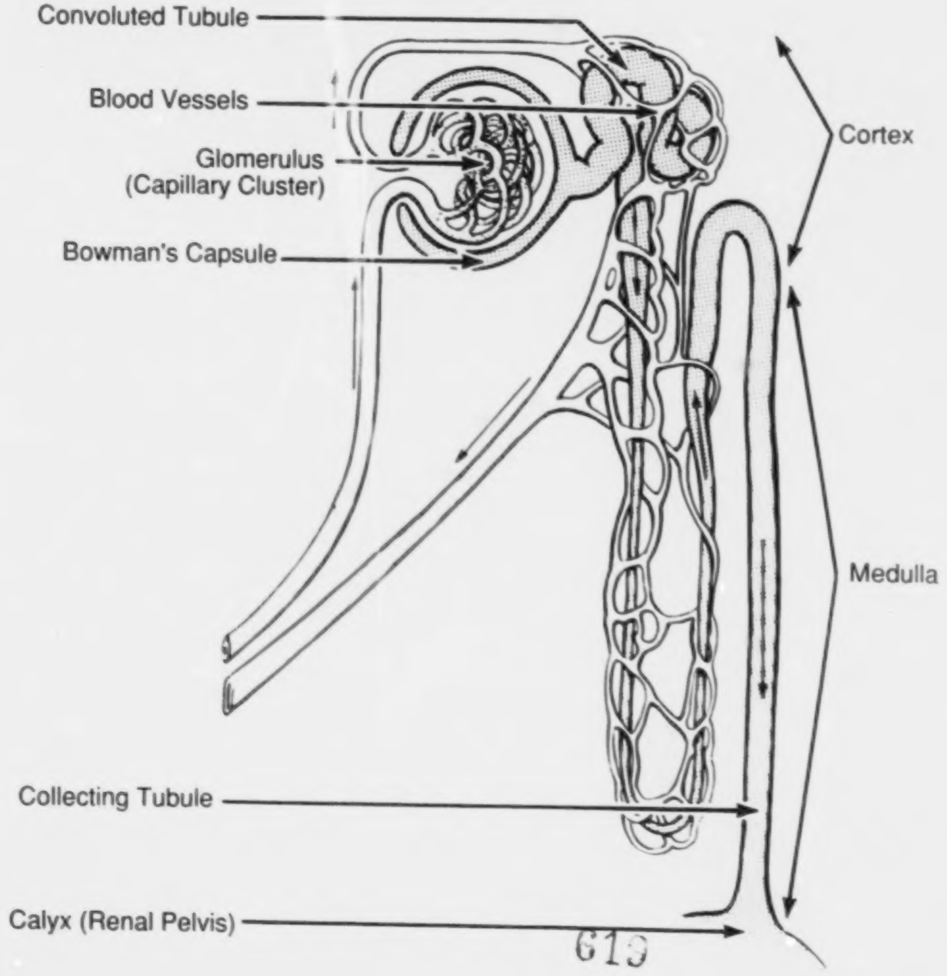
OBJECTIVE 5 | **Label parts of the kidney.**


Cortex
Medulla
Blood Vessel
Fibrous Capsule
Calyx (cut across)
Renal Basin or Pelvis
Ureter

OBJECTIVE 6 Match parts of the kidney to their descriptions.

- **calyx** – a bell-shaped cup in the renal pelvis
- **cortex** – the smooth, solid portion of the kidney where the greater part of the nephron is located
- **fibrous capsule** – membrane encasing the kidney
- **medulla** – the inner portion of the kidney where the nephron tubes come together in the collecting tubules
- **renal basin or pelvis** – the area where the upper ureter expands to form a basin which receives urine from the collecting tubules

OBJECTIVE 7 Label parts of the nephron.


Convoluted Tubule
Blood Vessels
Glomerulus (Capillary Cluster)
Bowman's Capsule
Cortex
Medulla
Collecting Tubule
Calyx (Renal Pelvis)

OBJECTIVE 8

Match parts of the nephron to their descriptions.

- **bowman's capsule** – a funnel-shaped structure partially enclosing the glomerulus that receives waste, water, glucose, and salts from the thin capillaries
- **collecting tubule** – collects the remaining mixture of waste products and water (urine) that has passed through the convoluted tubule
- **convoluted tubule** – a long, twisted tube that carries most of the water and salts and all glucose to be reabsorbed by the bloodstream
- **glomerulus** (glow-MARE-you-lus) – cluster of capillaries that filter blood as it comes from the renal arteries

OBJECTIVE 9

Choose the word or phrase that completes statements about the function of nephrons.

- The nephron is the basic functioning unit of the kidney.
- The functions of the nephron are:

  – filtration in the glomerulus

  – reabsorption in the convoluted tubule

  – secretion (concentration), the formation of urine
- As blood is pumped into the glomerulus under high pressure, all substances smaller than proteins pass through the capillary wall. This is the filtration process. Substances that can be used by the body, such as water, glucose, and amino acids, are carried out of the filtrate and reabsorbed back into the circulatory system. Waste products, such as urea and toxins become concentrated and are secreted as urine. The filtration and reabsorption process is highly effective.

  NOTE: Large volumes of blood are filtered for every drop of water that is produced as urine.

OBJECTIVE 10

Choose the word or phrase that completes statements about structure and functions of the ureter and the bladder.

Ureters

- The ureters are narrow tubes, approximately 1/8" (4-5 mm) in diameter and 10-12" (25-30 cm) in length.

- Ureters are attached to the kidney at the renal pelvis and empty into the urinary bladder.
- Urine moves through the ureters from the kidneys to the bladder by rhythmic contractions of the muscle wall.

Bladder

- When empty, the bladder lies below the peritoneum and behind the pubic joint; when full, it may extend upward into the abdominal cavity.
- The bladder is composed of many layers, including an inner mucous membrane lining, muscle layers, and connective tissue, and is partially covered with the peritoneum.
- The bladder is thick and folded when empty, but as it fills, it stretches and its walls become thinner. An adult bladder may hold more than a liter of urine.
- Urination occurs with voluntary relaxation of a sphincter, which is controlled by the nervous system.

OBJECTIVE 11

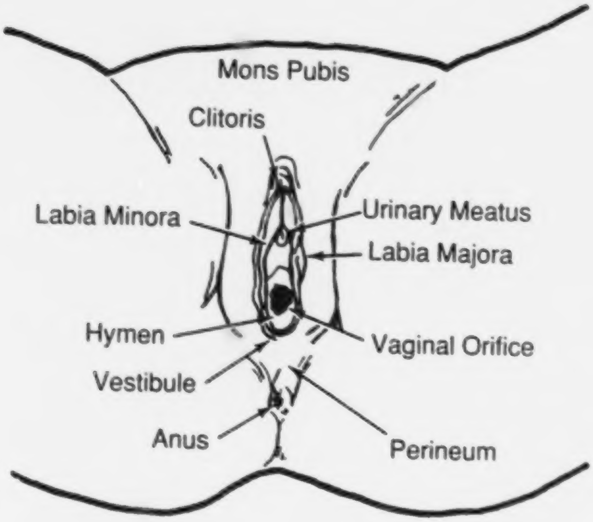
Distinguish between the structure and function of the male and female urethra.

Male

- Is part of both the reproductive and urinary systems
- Is approximately 8 inches (20 cm) long in the adult
- Passes through the prostate gland, where two ducts from the reproductive glands merge with it, and then through to the end of the penis

Female

- Is a thin-walled tube approximately 1-1 1/2 inches (4 cm) long
- Ends at the meatus which lies between the clitoris and the vaginal opening


Mons Pubis
Clitoris
Labia Minora
Urinary Meatus
Labia Majora
Hymen
Vaginal Orifice
Vestibule
Anus
Perineum

OBJECTIVE 12 **List terms that mean expelling urine.**

- Void
- Urination
- Micturition

OBJECTIVE 13 **Distinguish between normal and abnormal components of urine.**

Normal components

- Water (95 percent)
- Protein waste products (urea, uric acid, creatinine)

  NOTE: When kidney function is impaired, waste products may accumulate in the blood. This condition is called uremia.

- Mineral salts (sodium chloride, sulfates, and phosphate)
- Yellow pigment from certain bile compounds
- Toxins
- Hormones

Abnormal components

- Glucose (glycosuria)
- Albumin (albuminuria)
- Blood (hematuria)
- Pus cells (pyuria)
- Acetone (acetonuria)
- Casts

OBJECTIVE 14

Choose the word or phrase that completes statements about characteristics of normal urine.

- Total volume in 24 hours is approximately 1500 ml
- Straw-colored
- Clear
- Mild, aromatic odor

  NOTE: After standing, urine will begin to smell of ammonia.

- pH of 6.0 (slightly acid)
- Specific gravity of 1.010-1.030 (slightly heavier than distilled water)

  NOTE: This range of normal varies according to agency standards.

OBJECTIVE 15

Select from a list functions of water in the body.

The water found in the body is obtained from solid foods, soup, beverages, and water itself; it is also formed by metabolism of foods.

- Assists in the regulation of body temperature
- Removes waste products through intestines, kidneys, skin, and lungs
- Is an essential constituent of all tissues and fluids
- Transports nutrients from the digestive tract to the bloodstream and from one cell to another

623

- Lubricates joints and moistens viscera for easier movement
- Aids digestion by softening, diluting, and liquefying foods

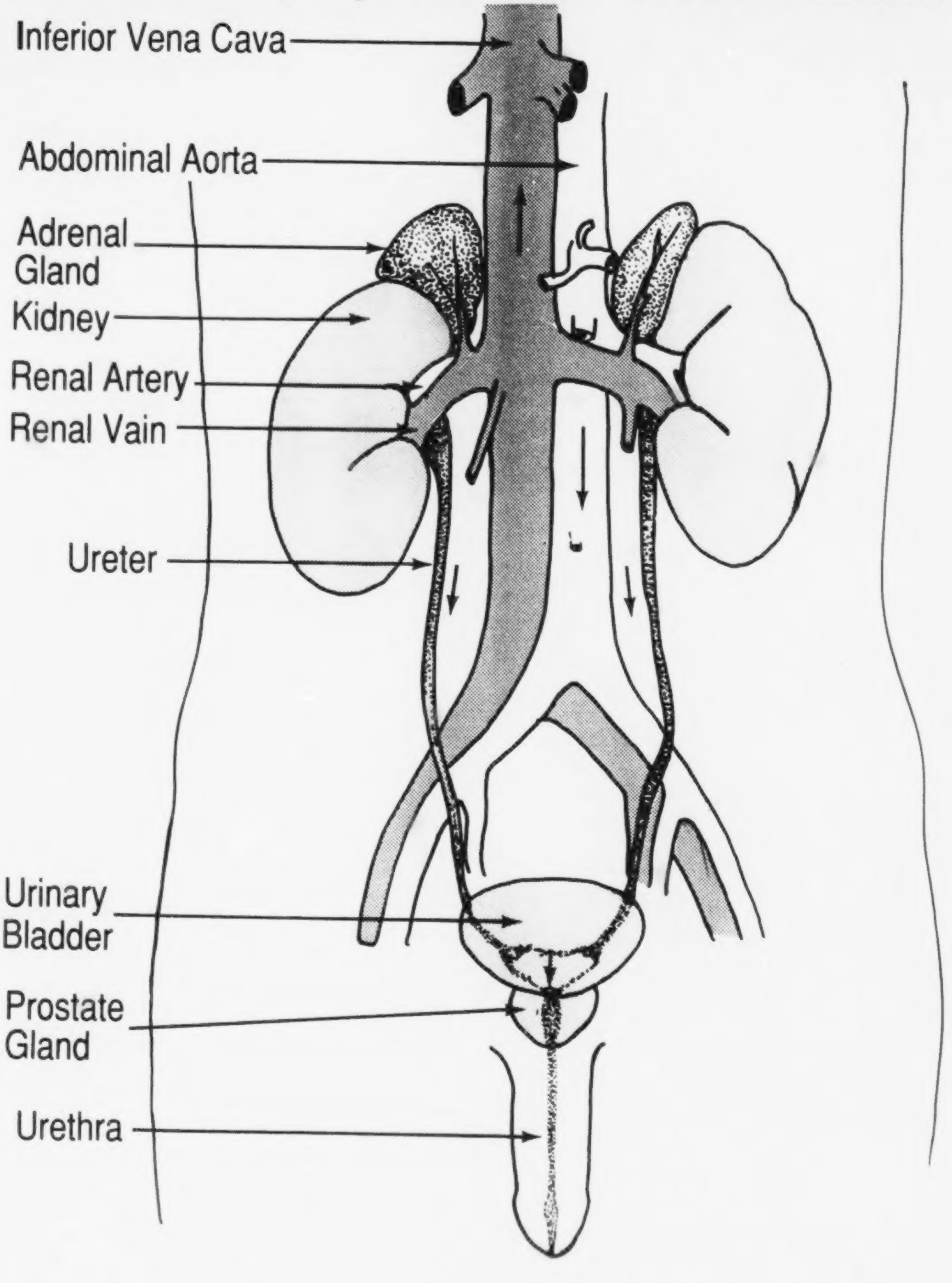
OBJECTIVE 16

Select from a list ways the kidneys maintain homeostasis of the body.

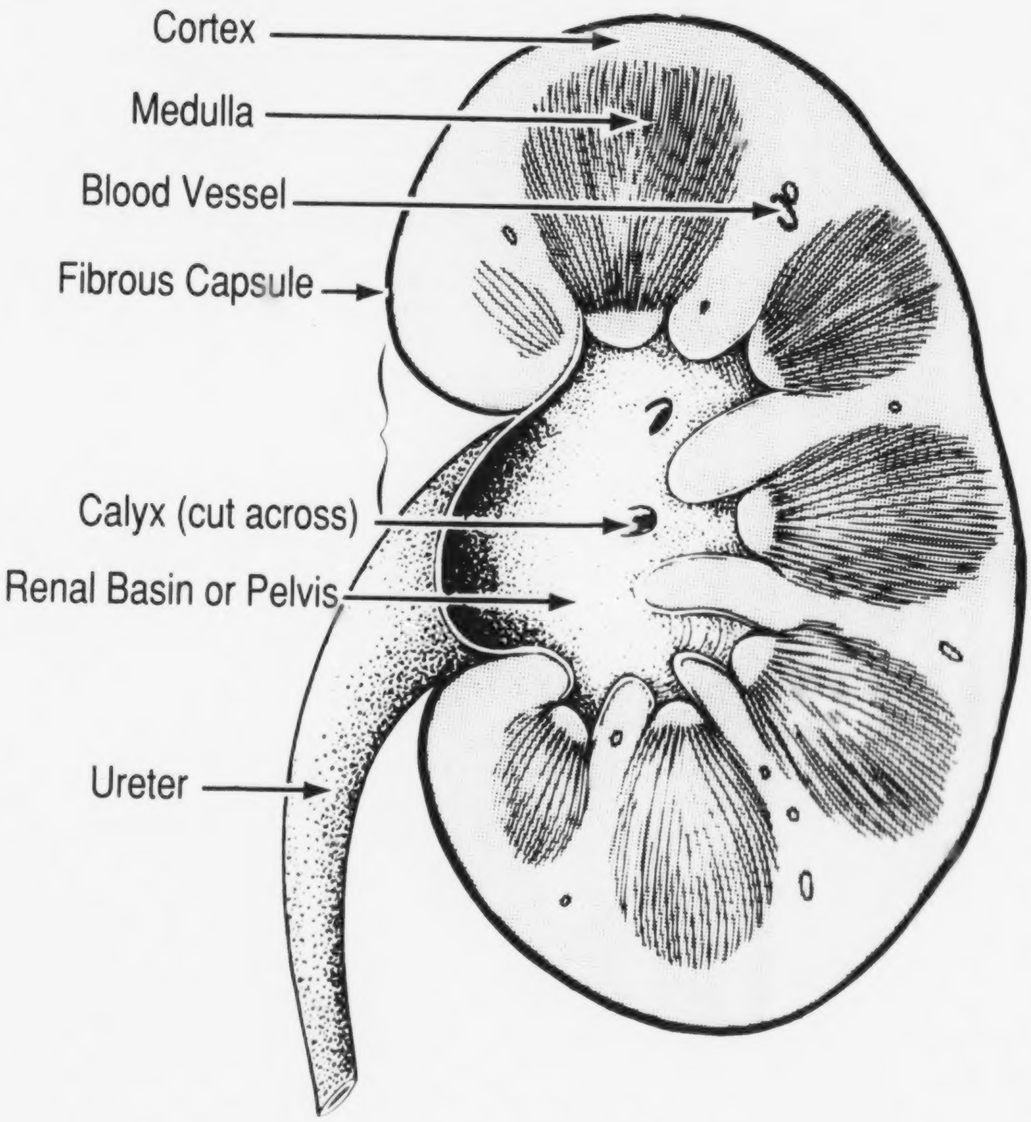
NOTE: The kidneys are controlled by the central nervous system through negative feedback.

- Concentration of specific electrolytes
- Osmolality of body fluids
- Volume of extracellular fluid
- Blood volume
- Blood pH

The Urinary System with Blood Vessels


Inferior Vena Cava
Abdominal Aorta
Adrenal Gland
Kidney
Renal Artery
Renal Vain
Ureter
Urinary Bladder
Prostate Gland
Urethra

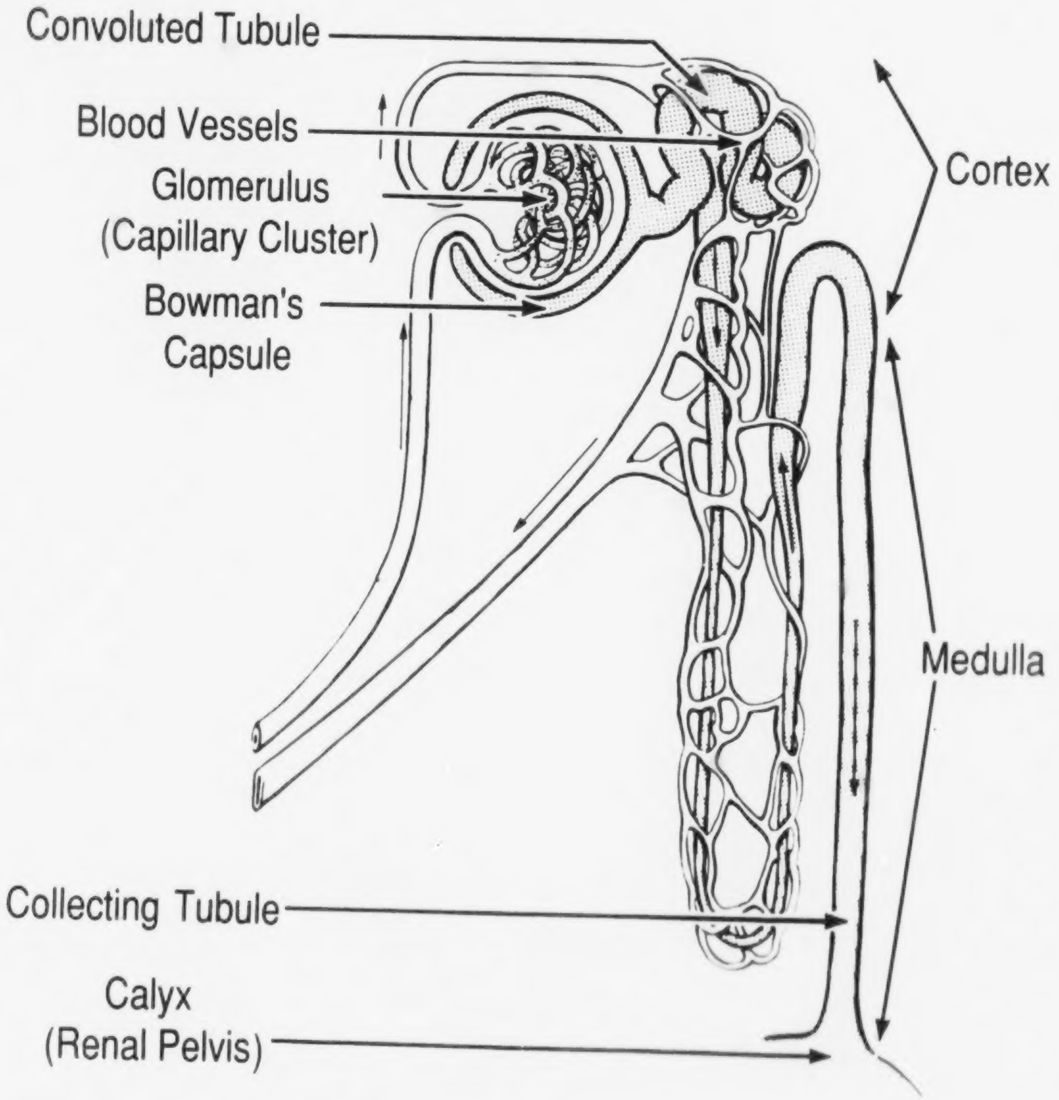
Vertical Section Through A Kidney


Cortex
Medulla
Blood Vessel
Fibrous Capsule
Calyx (cut across)
Renal Basin or Pelvis
Ureter

626

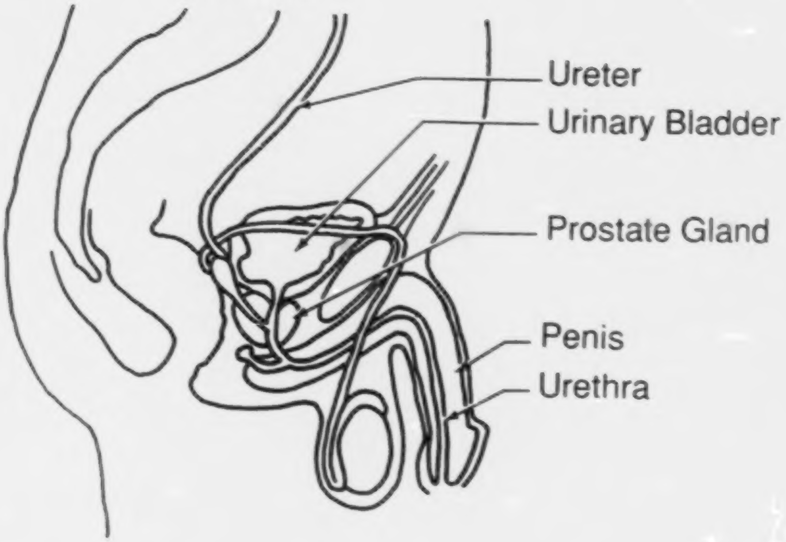
TM 3

A Simplified Nephron

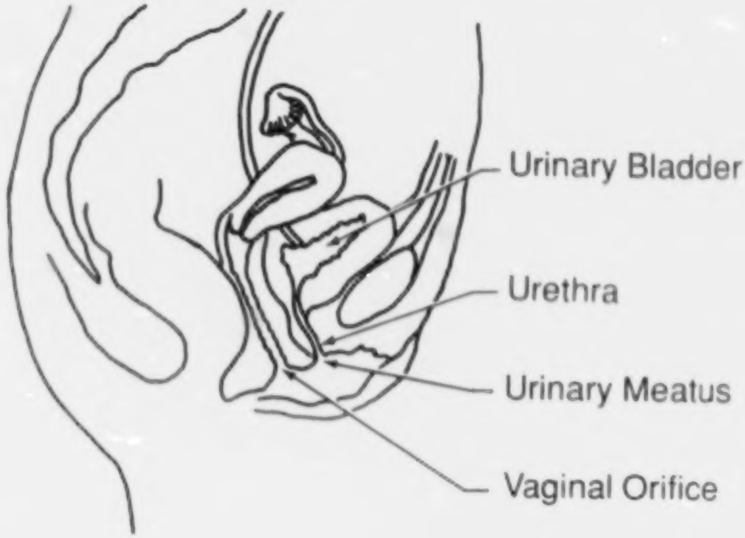

Convoluted Tubule
Blood Vessels
Glomerulus (Capillary Cluster)
Bowman's Capsule
Cortex
Medulla
Collecting Tubule
Calyx (Renal Pelvis)

Urinary System

MALE


Ureter
Urinary Bladder
Prostate Gland
Penis
Urethra

FEMALE


Urinary Bladder
Urethra
Urinary Meatus
Vaginal Orifice

ACTIVITY SHEET

Development of:
READING SKILLS
SCIENCE SKILLS

- Introduce the assignment to the students by discussing why reading and science skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Interpret graphics and symbols

  SCIENCE SKILLS

  - Investigate/apply principles of anatomy/physiology

- If students have difficulty interpreting graphics and symbols:

  - Remind them that interpreting a graphic is very similar to reading a page. Each part of the graphic or symbol has a meaning within the art.

  - Suggest that, when they have a graphic, chart, diagram, or table to interpret, they should carefully study the art and compare it to any similar pieces encountered. Also study the key or any other information that will help you understand the meaning of the graphic.

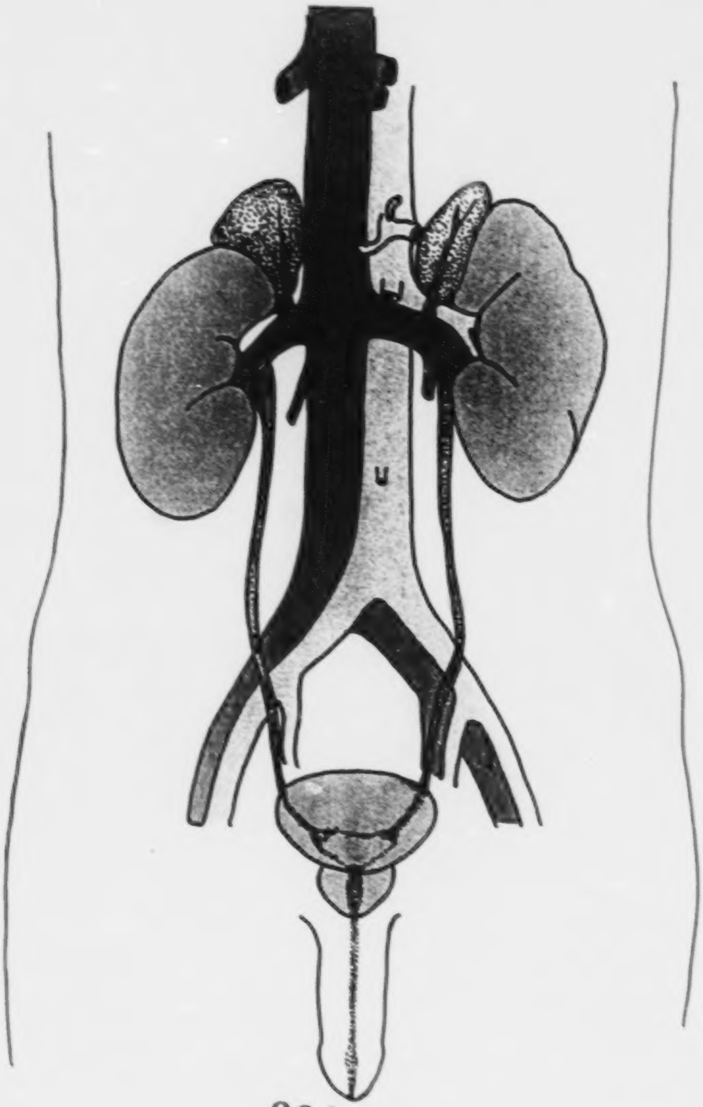
- If students have difficulty investigating/applying the principles of anatomy/physiology, remind them that it is important in any area of work or study to have consistent ideas or principles that everyone uses. Explain that sometimes it is necessary to express these in graphic format so that it will be easy for people to relate them to the body.

ACTIVITY SHEET

THE URINARY SYSTEM XII

TRACE A GLASS OF WATER

Using the diagram below, trace the path of a glass of water through the urinary system. Shade in and label all affected organs.



ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization
  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language
  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing self confidence/esteem

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

- As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

- Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

- Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

- Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:
    - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.
    - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).
    - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.
    - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:
  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.
  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.
- If students have difficulty adapting their presentation to a specific audience:
  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.
  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.
- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

- If students have difficulty developing self confidence/esteem:
    - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.
    - Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.
    - Allow the students to work in heterogenous groups to enable the less confident students to learn fron the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE URINARY SYSTEM XII

Name ______________________________ Score ____________

OBJECTIVE 17

Communicate about how the urinary system works.

INTRODUCTION

When the urinary system fails to operate properly, waste products cannot be flushed from the body. The resulting build-up of toxins may lead to pain, illness, or death. We don't think much about how our urinary systems function. As health care workers, you will be expected to explain about the urinary system.

DIRECTIONS

Create a poster, pamphlet, brochure, oral report, or skit on the urinary system. Present the project to your class.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (written and oral)

Job Acquisition/ Development Skills
- Develop self confidence/esteem

THE URINARY SYSTEM

Work should include up-to-date, accurate information presented in a useful manner. All HOSA guidelines should be met.

WRITTEN TEST

THE URINARY SYSTEM

XII

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with the urinary system to their definitions. Write the correct letters in the blanks.

Part I

_____ 1. The process of giving off a specific product as a result of the activity of a gland

_____ 2. The state of being stretched out or overfilled

_____ 3. The chief nitrogenous component of urine

_____ 4. Pertaining to the liver

_____ 5. The tube that carries urine from the bladder to the outside of the body

_____ 6. The study of the kidney

_____ 7. External opening of the urethra

_____ 8. Pertaining to the kidney

_____ 9. Pertaining to or composed of blood vessels

_____ 10. the tube that carries urine from the kidney to the bladder

a. adrenal
b. distention
c. excretion
d. hepatic
e. nephrology
f. nephron
g. renal
h. secretion
i. specific gravity
j. urea
k. ureter
l. urethra
m. urinary meatus
n. urology
o. vascular

May be photocopied for student use

Part II

_____ 1. Basic functional unit of the kidneys

_____ 2. A depression or recess at the exit or entrance of a duct, nerve, or vessel into a gland

_____ 3. A doughnut-shaped, muscular gland surrounding the superior male urethra

_____ 4. Endocrine gland on the kidney

_____ 5. The erectile female organ at the anterior end of the labia minora

_____ 6. Fibrous material thrown off in various pathological conditions

_____ 7. Osmotic concentration; the concentration of ions in a dissolved substance compared to the amount of solvent

_____ 8. Removing useless substances (waste products of cell metabolism) from the blood and lymph

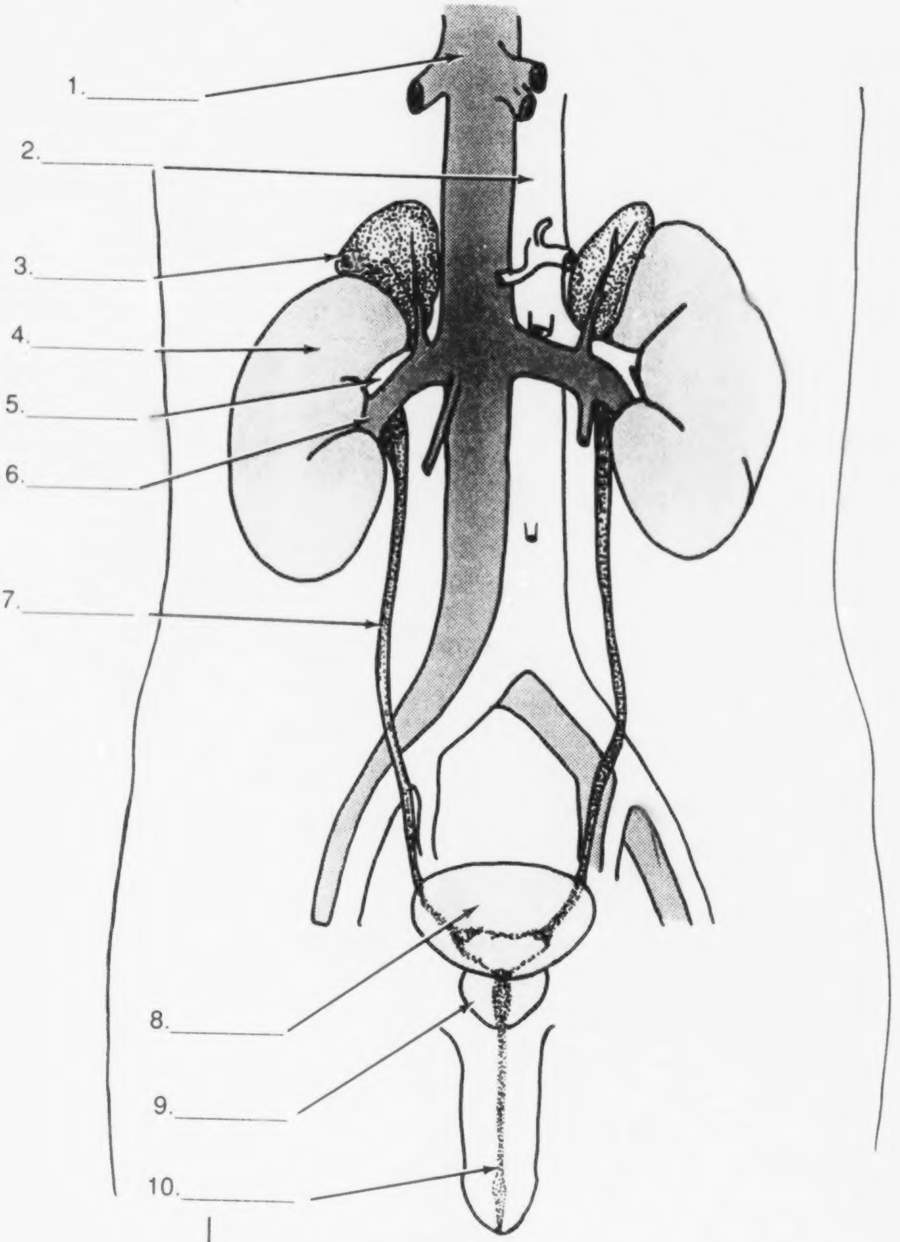
_____ 9. The study of the urinary system

_____ 10. The weight of a substance compared with an equal volume of water

a. adrenal
b. clitoris
c. distention
d. excretion
e. hepatic
f. hilum
g. nephrology
h. nephron
i. osmolality
j. prostate gland
k. renal
l. secretion
m. specific gravity
n. urinary casts
o. urology

May be photocopied for student use.

OBJECTIVE 2 | **Label structures of the urinary system.** Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 3 **Choose the word or phrase that completes statements about the location and structure of kidneys.** Write the correct letter in the blank.

_____ 1. Kidneys are

a. bean-shaped and yellowish green

b. pear-shaped and reddish brown

c. pear-shaped and yellowish green

d. bean-shaped and reddish brown

_____ 2. Kidneys are embedded in fatty tissue and surrounded by a fibrous tissue called

a. renal fascia

b. hepatic fascia

c. renal ilia

d. hepatic ilia

_____ 3. Kidneys are protected somewhat by the

a. diaphragm

b. hips

c. ribs and their cartilages

d. spine

_____ 4. Blood vessels and nerves enter the kidney and the ureter leaves the kidney at the

a. hilum

b. cortex

c. medulla

d. renal basin

May be photocopied for student use

OBJECTIVE 4

Select from a list functions of the kidneys. Write an "X" in the blank before each kidney function.

_____ 1. Assistance in fighting infection

_____ 2. Assistance in maintaining the water balance of the body

_____ 3. Excretion of waste products

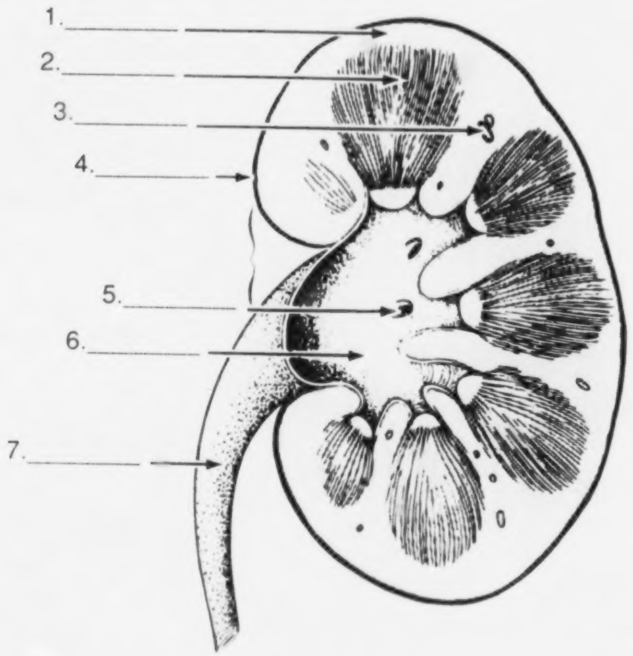
_____ 4. Storage of urine

_____ 5. Assistance in regulating the acid-base balance of the body

_____ 6. Assistance in maintaining the electrolyte balance of the body

OBJECTIVE 5

Label parts of the kidney. Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 6

Match parts of the kidney to their descriptions. Write the correct letter in the blanks.

_____ 1. The inner portion of the kidney where the nephron tubes come together in the collecting tubules

_____ 2. Membrane encasing the kidney

_____ 3. The smooth, solid portion of the kidney where the greater part of the nephron is located

_____ 4. A bell-shaped cup in the renal pelvis

_____ 5. The area where the upper ureter expands to form a basin which receives urine from the collecting tubules

a. calyx

b. carotid

c. cortex

d. fibrous capsule

e. medulla

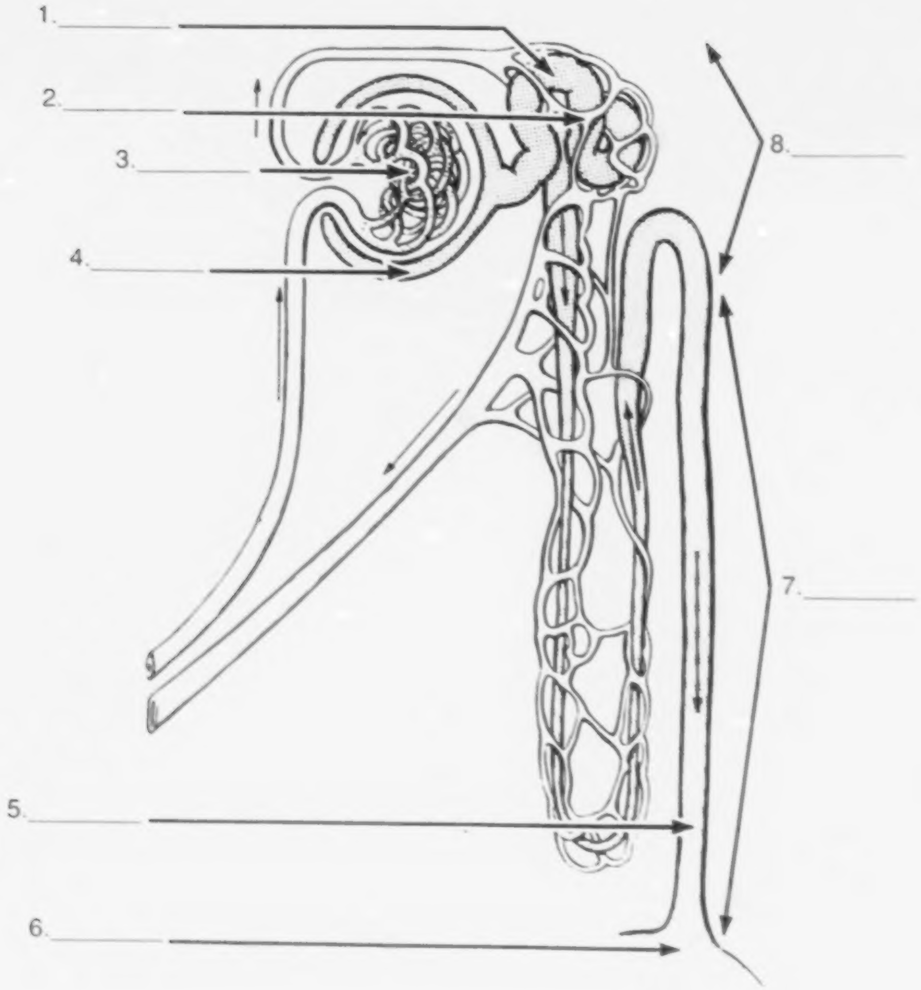
f. medussa

g. pelvic cavity

h. renal basin or pelvis

May be photocopied for student use.

OBJECTIVE 7 | **Label parts of the nephron.** Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 8

Match parts of the nephron to their descriptions. Write the correct letter in the blank.

_____ 1. A funnel-shaped structure partially enclosing the glomerulus that receives waste, water, glucose, and salts from the thin capillaries

_____ 2. Collects the remaining mixture of waste products and water (urine) that has passed through the convoluted tubule

_____ 3. Cluster of capillaries that filter blood as it comes from the renal arteries

_____ 4. A long, twisted tube that carries most of the water and salts and all glucose to be reabsorbed by the bloodstream

a. bowman's capsule

b. bowman's tubule

c. collecting tubule

d. convoluted tubule

e. glomerulus

f. glomerulus tubule

OBJECTIVE 9

Choose the word or phrase that completes statements about the function of nephrons. Write the correct letter in the blank.

_____ 1. The functions of the nephron include all of the following except

a. filtration of the glomerulus

b. production of hormones

c. reabsorption in the convoluted tubule

d. secretion (concentration), the formation of urine

_____ 2. The nephron is the

a. basic functioning unit of the kidney

b. link between the kidney and bladder

c. link between the kidney and ureter

d. hormone-producing center of the kidney

May be photocopied for student use.

_____ 3. As blood is pumped into the glomerulus under high pressure, all substances smaller than proteins

a. are washed away

b. are blocked by the capillary walls

c. pass through the capillary walls

d. become positively charged

_____ 4. Substances that can be used by the body, such as water, glucose, and amino acids, are carried out of the filtrate and reabsorbed back into the

a. urinary system

b. digestive system

c. circulatory system

d. endocrinial system

OBJECTIVE 10

Choose the word or phrase that completes statements about structures and functions of the ureter and the bladder. Write the correct letter in the blank.

_____ 1. The ureters are narrow tubes, approximately 1/8" (4-5 mm) in diameter and

a. 6-8" in length

b. 8-10" in length

c. 10-12" in length

d. 12-14" in length

_____ 2. Ureters are attached to the kidney at the renal pelvis and empty into the

a. urinary bladder

b. urethra

c. renal artery

d. prostate gland in men

May be photocopied for student use.

645

_____ 3. Urine moves through the ureters from the kidneys to the bladder by

a. gravity

b. vibrations from the heartbeats

c. a vacuum created in the urethra

d. rhythmic contractions of the muscle wall

_____ 4. When empty, the bladder lies below the peritoneum and behind the pubic joint; when full, it may extend

a. upward into the abdominal cavity

b. downward into the abdominal cavity

c. into the urethra

d. beyond the peritoneum

_____ 5. The bladder is composed of many layers, including an inner mucous membrane lining, muscle layers and

a. nerve-filled tissue

b. connective tissue

c. blood vessel-filled tissue

d. fatty tissue

_____ 6. An adult bladder may hold more than

a. one gallon of urine

b. one quart of urine

c. one liter of urine

d. two cups of urine

May be photocopied for student use.

_____ 7. Urination occurs with voluntary relaxation of a sphincter, which is controlled by the

a. kidney

b. weight of the bladder

c. nervous system

d. level of uric acid in the blood stream

OBJECTIVE 11

Distinguish between the structure and function of the male and female urethra. Write an "M" in the blank before statements about the male urethra and an "F" before statements about the female urethra.

_____ 1. Is approximately 8 inches (20 cm) long in the adult

_____ 2. Is part of both the reproductive and urinary systems

_____ 3. Is a thin-walled tube approximately 1-1 1/32 inches (4 cm) long

_____ 4. Passes through the prostate gland

_____ 5. The meatus lies between the clitoris and the vaginal opening

OBJECTIVE 12

List terms that mean expelling urine.

1. ______________________________

2. ______________________________

3. ______________________________

OBJECTIVE 13

Distinguish between normal and abnormal components of urine. Write an "N" in the blank before normal components and an "A" before abnormal components.

_____ 1. Toxins

_____ 2. Glucose

_____ 3. Albumin

May be photocopied for student use

_____ 4. Casts

_____ 5. Protein waste products

_____ 6. Hormones

_____ 7. Water

_____ 8. Blood

_____ 9. Yellow pigment from certain bile compounds

_____ 10. Acetone

_____ 11. Pus cell

_____ 12. Mineral salts

OBJECTIVE 14

Choose the word or phrase that completes statements about characteristics of normal urine. Write the correct letter in the blank.

_____ 1. Total volume in 24 hours is approximately

a. 500 ml

b. 750 ml

c. 1000 ml

d. 1500 ml

_____ 2. Normal urine color is

a. straw-colored and clear

b. straw-colored and slightly cloudy

c. brown and clear

d. yellow and slightly cloudy

May be photocopied for student use.

_____ 3. Norman urine odor is

a. mildly acid-like

b. strongly ammonia-like

c. mildly aromatic

d. strongly sour-smelling

_____ 4. Normal pH of urine is

a. 2.5

b. 3.0-4.0

c. 5.25

d. 6.0

_____ 5. Normal specific gravity of urine, 1.010-1.030, is

a. approximately equal to distilled water

b. slightly heavier than distilled water

c. slightly lighter than distilled water

d. much lighter than distilled water

OBJECTIVE 15

Select from a list functions of water in the body. Write an "X" in the blank before functions.

_____ 1. Aids digestion by softening, diluting, and liquefying foods

_____ 2. Transports oxygen

_____ 3. Aids in the digestion of food by producing enzymes

_____ 4. Prevents deterioration of the skeletal system

_____ 5. Is removed from the body as quickly as possible

_____ 6. Lubricates joints and moistens viscera for easier movement

May be photocopied for student use.

______ 7. Is an essential constituent of all tissues and fluids

______ 8. Assists in the regulation of body temperature

______ 9. Removes waste products through intestines, kidneys, skin, and lungs

______ 10. Transports nutrients from the digestive tract to the bloodstream and from one cell to another

OBJECTIVE 16

Select from a list ways the kidney maintains homeostasis of the body. Write an "X" in the blanks before ways kidneys maintain homeostasis.

______ 1. Concentration of specific electrolytes

______ 2. Monitors perspiration

______ 3. Stores and concentrates reserve fluid

______ 4. Volume of extracellular fluid

______ 5. Blood volume

______ 6. Osmolality of body fluids

______ 7. Blood pH

______ 8. Sodium levels

NOTE: Objective 17 is evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

THE URINARY SYSTEM

XII

OBJECTIVE 1

Part I		Part II	
1.	h	1.	h
2.	b	2.	f
3.	j	3.	j
4.	d	4.	a
5.	l	5.	b
6.	e	6.	n
7.	m	7.	i
8.	g	8.	d
9.	o	9.	o
10.	k	10.	m

OBJECTIVE 2

1. inferior vena cava
2. abdominal aorta
3. adrenal gland
4. kidney
5. renal artery
6. renal vein
7. ureter
8. urinary bladder
9. prostate gland
10. urethra

OBJECTIVE 3

1. d
2. a
3. c
4. a

OBJECTIVE 4 2, 3, 5

OBJECTIVE 5

1. cortex
2. medulla
3. blood vessel
4. fibrous capsule
5. calyx
6. renal basin or pelvis
7. ureter

OBJECTIVE 6

1. e
2. d
3. c
4. a
5. h

OBJECTIVE 7

1. convoluted tubule
2. blood vessels
3. glomerulua or capillary cluster
4. bowman's capsule
5. collecting tubule
6. calyx (renal pelvis)
7. medulla
8. cortex

652

OBJECTIVE 8	1.	a
	2.	c
	3.	e
	4.	d
OBJECTIVE 9	1.	b
	2.	a
	3.	c
	4.	c
OBJECTIVE 10	1.	c
	2.	a
	3.	d
	4.	a
	5.	b
	6.	c
	7.	c
OBJECTIVE 11	1.	M
	2.	M
	3.	F
	4.	M
	5.	F
OBJECTIVE 12	•	Void
	•	Urination
	•	Micturition

OBJECTIVE 13	1.	N
	2.	A
	3.	A
	4.	A
	5.	N
	6.	N
	7.	N
	8.	A
	9.	N
	10.	A
	11.	A
	12.	N
OBJECTIVE 14	1.	d
	2.	a
	3.	c
	4.	d
	5.	b
OBJECTIVE 15	1, 6, 7, 8, 9, 10	
OBJECTIVE 16	1, 4, 5, 6, 7	

OBJECTIVE SHEET

THE CENTRAL NERVOUS SYSTEM

XIII

INTRODUCTION

Each body system fulfills a specific purpose. Each is necessary to sustain health and life. But they must all function in harmony with each other and with the environment. The central nervous system, made up of the spine, brain, and brain stem, coordinates these functions, accepts and processes input from outside the body, regulates autonomic functions, and controls the body.

UNIT OBJECTIVE

After completing this unit the student will be able to identify the divisions of the nervous system, components, regeneration, and actions of nerves, and areas of the brain and their functions. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the central nervous system to their definitions.
2. Select from a list functions of the nervous system.
3. Distinguish among divisions of the nervous system.
4. Label parts of the neuron.
5. Match parts of a neuron to their descriptions.
6. Match types of neurons to their functions.
7. Arrange in order the mechanisms of peripheral nerve regeneration.
8. Write the sequence of basic nerve transmission.
9. Label the main structures of the central nervous system.
10. Label the external surface of the brain.
11. Label the functional areas of the brain.
12. Match parts of the brain to their functions.
13. Choose the word or phrase that completes statements about vessels that supply blood to the brain.

14. Select from a list functions of the spinal cord.

15. List sources of protection for the central nervous system.

16. Match the protective layers of the brain and spinal cord to their descriptions.

17. Choose the word or phrase that completes statements about the formation, purpose, and absorption of cerebrospinal fluid.

18. Communicate about how the central nervous system works. (Assignment Sheet)

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Review Unit XIV, The Peripheral Nervous System, for related objectives.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Order materials to supplement unit. Models of the spine, brain, and skull are available from Health Edco, P.O. Box 21207, Waco, Texas 76702-9964, 1-800-299-3360.
- Invite a neurologist, acupuncturist, or other professional to discuss characteristics of the central nervous system.

  NOTE: Supply guest speakers with the objective sheet, information sheet, and any other components you want them to cover.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.

- Assist students in scheduling and presenting prepared and extemporaneous speeches.
- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the central nervous system to their definitions.

- Terms will be used in discussing the central and peripheral nervous systems, as well as in discussing special senses.
- Relate terms to brain area to make learning and understanding easier for students.
- Use Transparencies 1 and 2 to illustrate and further explain terms.

Objective 2: Select from a list functions of the nervous system.

- Have students suggest examples of each function.
- Have students list all central nervous system functions taking place in the classroom at the time.

Objective 3: Distinguish among divisions of the nervous system.

- Use Transparency 3 to illustrate the differences between nervous systems.
- Have students list functions carried out by each nervous system.
- Refer students to Supplement 1. Discuss the interrelationships of the CNS, ANS, and PNS.

Objective 4: Label parts of a neuron.

Objective 5: Match parts of a neuron to their descriptions.

Objective 6: Match types of neurons to their functions.

- Use Transparencies 1 and 2 to illustrate objective information.
- Use Transparency 4 to illustrate and further explain types and functions of neurons.
- If only one term is to be used in class, tell students what that term is. Explain that they will be responsible for knowing all terms on the written test and in future units and courses.
- If possible, allow students to view nerves under a microscope.
- Display a variety of drawings of axons, and point out the layers in each.

Objective 7: Arrange in order the mechanisms of peripheral nerve regeneration.

- Use Transparency Master 5 to illustrate regeneration of nerve fibers.
- Have students discuss the effects of nerve fibers regenerative patterns on patient's recovery.

Objective 8: Write the sequence of basic nerve transmission.

- Explain the sequence of nerve transmission. Review chemical, as well as mechanical, changes.
- Discuss break-downs in the sequence and how they affect people.
- Discuss how nerve transmissions are used by other systems and discuss a variety of specialized transmissions, such as vision or muscle movement.
- Use Transparencies 4–6.

659

Objective 9: Label the main structures of the central nervous system.

Objective 10: Label the external surface of the brain.

Objective 11: Label the functional areas of the brain.

Objective 12: Match parts of the brain to their functions.

- Discuss each section of the brain and its function.
- Discuss the effect of injury to different areas of the brain.
- Discuss the path of brain messages to and from the peripheral and autonomic nervous systems.
- Use Transparencies 7 and 8.
- Encourage students to bring related information or stories to class. Information about left/right brain dominance and training, brain dominance and its relationship to learning disabilities, psychological experiments and treatments on the hypothalamus, and "strange but true" injuries and recoveries will increase interest in the unit.

Objective 13: Choose the word or phrase that completes statements about vessels that supply blood to the brain.

- Discuss back problems students may have experienced and how they affected the spinal cord or nervous system.
- Discuss acupuncture and its role in medicine.
- Display models and illustrations of the spine and related nerves.

Objective 14: Select from a list functions of the spinal cord.

Objective 15: List sources of protection for the central nervous system.

- Identify protective structures.
- Have students categorize protection in a variety of ways such as type of tissue (bone, integument, etc.), area of the nervous system, or type of protection (from injury, from infection, etc.).

660

Objective 16: Match the protective layers of the brain and spinal cord to their descriptions.

Objective 17: Choose the word or phrase that completes statements about the formation, purpose, and absorption of cerebrospinal fluid.

- Have students compare blood to cerebrospinal fluid.
- Have students suggest fluids or other items that protect in similar ways.

APPLICATION

Objective 18: Communicate about how the central nervous system works.

- Introduce students to sources of current medical information they may not be familiar with.
- Have students complete the assignment sheet.
- Relate presented information to the associated brain areas and nerve functions.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- The following films are available from Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700.

Anatomy and Physiology Filmstrips, The Nervous System - Unit 5. Filmstrip, cassette and instructor's guide.

Human Systems Filmstrip Sets, Nervous System in the Human Body, filmstrip with cassette, student self-instruction booklet. Covers brain structure and function, nerve tissues and the skin-to-spine pathway.

Your Body: Series III, VHS video from filmstrip and teacher's guide. Covers the nervous system and its parts and the brain.

Software

- The following software is available from Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700.

  The Human Body: An Overview, software, courseware kit and teacher's guide. Includes multiple choice, true-false, and short answer review. For use on Apple computers, 48K.

  Experiments in Human Physiology, software, teacher's guide, experiment instructions, interface box, temperature probes, timer plug, light and light sensor and extender cables. Uses experiments to measure physiological responses. For use on Apple computers, 48K.

UNIT REFERENCES

- *Allied Health Careers*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma, 1987.
- Crider, Andrew B., et al. *Psychology*. Scott, Foresman and Company, Glenview, Illinois, 1986.
- Fong, Elizabeth, Elvira B. Ferris, and Esther G. Skelley, *Body Structures and Functions*, Delmar Publishers, Albany, New York, 1989.
- Rogers, Helen V., *Practical Nursing Volume 1*, Oklahoma State Department of Vocational and Technical Education, Stillwater, Oklahoma, 1981.

INFORMATION SHEET

THE CENTRAL NERVOUS SYSTEM XIII

OBJECTIVE 1

Match terms associated with the central nervous system to their definitions.

- **affector** — nerves that function in the reception of stimuli; the receiving end of sensory nerves
- **autonomic nervous system** — automatically regulates the action of the glands, the smooth muscles of the hollow organs, and the heart, often without one's awareness
- **axon** — part of the neuron that conducts impulses to the cell body
- **central nervous system** — consists of nerve tissues that form the brain and spinal cord; controls voluntary acts
- **cerebral cortex** — the outer layer of gray matter of the cerebrum
- **cerebrospinal fluid** — watery fluid found in the ventricles of the cerebrum and surrounding the spinal cord
- **cyton** — cell body that acts as a sending and receiving center, carries on metabolism, and stores energy
- **dendrite** — the part of the neuron that carries impulses to the cell body
- **effector** — motor nerve endings that carry out actions
- **meninges** — the membranes covering the brain and spinal cord
- **myelin** — a substance that forms a sheath around the axons of some nerves
- **nerve fibers** — thread-like projections of cytoplasm from the cell body of a neuron; axons and dendrites
- **nerve tract** — bundle of nerve cells within the central nervous system
- **neuroglia** — supporting structure for nerve tissue consisting of blood vessels, connective tissue, and specialized cells
- **neurology** — the study of the nervous system

- **neuron** — basic nerve cell
- **occipital** — pertaining to the back of the head
- **peripheral nervous system** — provides input from sensory receptors to the central nervous system and output from the central nervous system to effectors
- **regeneration** — repair, regrowth, or restoration of a part
- **stimulus** — any agent or influence that produces a response or increase in activity in living protoplasm
- **synapse** — the junction of an axon and one or more dendrites
- **ventricles** — large cavities of the brain

OBJECTIVE 2

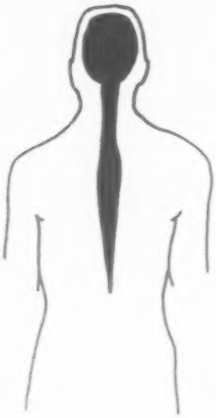
Select from a list functions of the nervous system.

- Reception of external stimuli

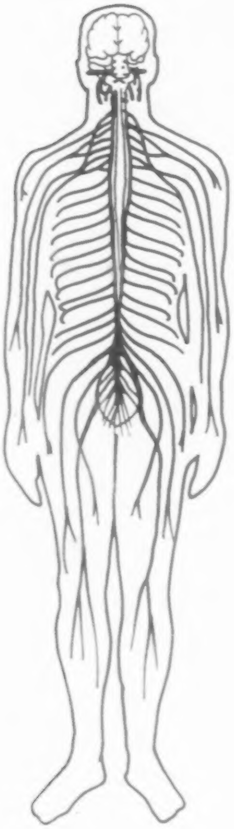
  EXAMPLES: Temperature, sound, pain
- Coordination of internal messages

  EXAMPLES: Hunger, fatigue
- Response and readjustment to internal and external stimuli
- Memory
- Coordination of all body activities

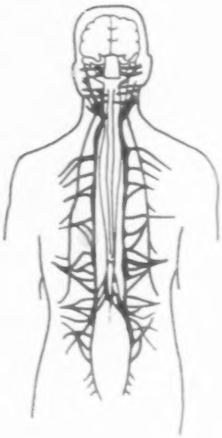
OBJECTIVE 3 | **Distinguish among divisions of the nervous system.**



Central



Peripheral



Autonomic

Central nervous system

- Brain
- Spinal cord
- Brain stem

Peripheral nervous system

NOTE: These nerves extend to outlying parts of the body.

- Cranial nerves (12 pairs)
- Spinal nerves (31 pairs)

Autonomic nervous system (involuntary nervous system)

- Glandular action

  EXAMPLES: Production of insulin from the beta cells of the pancreas; thyroxin from the thyroid

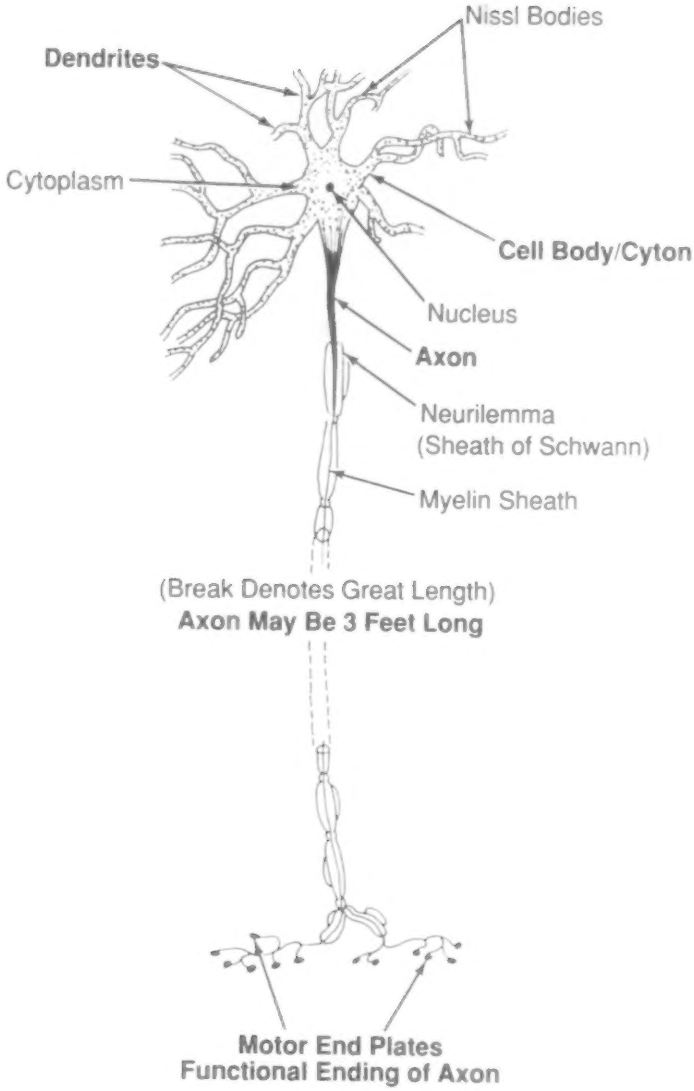
- Smooth muscles of hollow organs

  EXAMPLE: Small intestine

- Cardiac muscle

NOTE: There are two divisions of the autonomic nervous system. The sympathetic system accelerates some body processes and the parasympathetic helps to balance action of the sympathetic system.

OBJECTIVE 4 | **Label parts of a neuron.**


Nissl Bodies
Dendrites
Cytoplasm
Cell Body/Cyton
Nucleus
Axon
Neurilemma
(Sheath of Schwann)
Myelin Sheath
(Break Denotes Great Length)
Axon May Be 3 Feet Long
Motor End Plates
Functional Ending of Axon

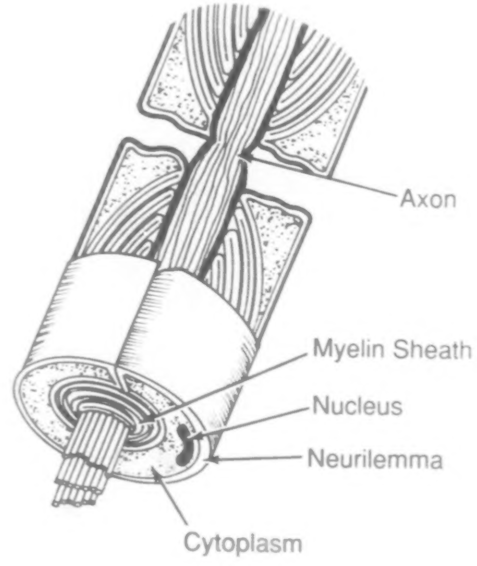
OBJECTIVE 5

Match parts of a neuron to their descriptions.

- **axon** – transfers input away from the cell body
- **cell body** – the portion of the neuron containing the nucleus and cytoplasm

  NOTE: The cell body is also called a "cyton."
- **cytoplasm** – the thick fluid inside the cell, but outside the nucleus
- **dendrites** – the process or extension of a nerve cell that transfers input toward the cell body
- **motor end plates** – the end of the axon in which neurotransmitters are stored and from which they are sent to continue the nerve impulse

  NOTE: Motor end plates are also called "axon terminals."
- **myelin sheath** – the casing around an axon that insulates the axon and speeds impulses
- **neurilemma** – the cell body of the Schwann cell surrounding the axon and forming the myelin sheath



- **nissl bodies** – granules found in both the cell body and dendrites which are concerned with metabolism and protein synthesis
- **nucleus** – the central structure of the cell in which characteristics are determined and transfered

OBJECTIVE 6

Match types of neurons to their functions.

- **afferent or sensory** — receive messages from all parts of the body and transmit them to the central nervous system
- **internuncial, central, or connecting** — conduct messages or impulses from sensory to motor nerves

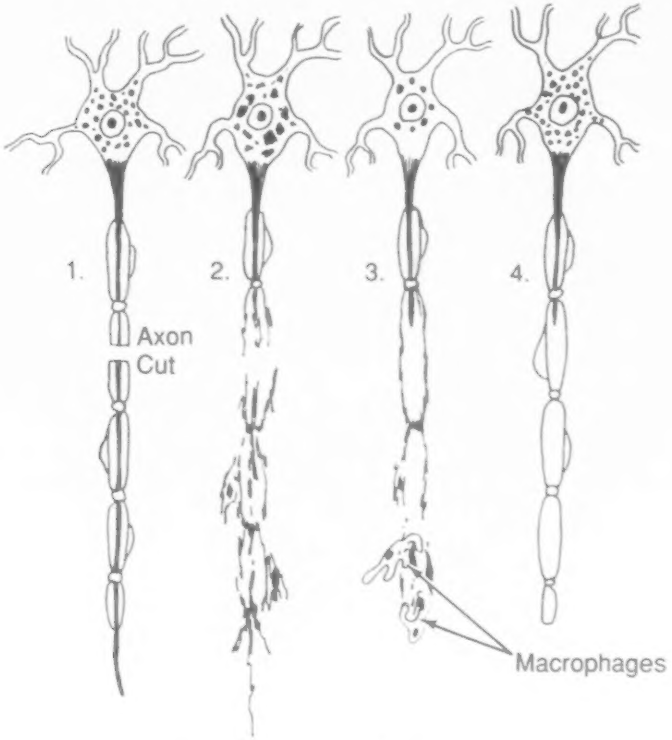
  NOTE: These are found only in the central nervous system.

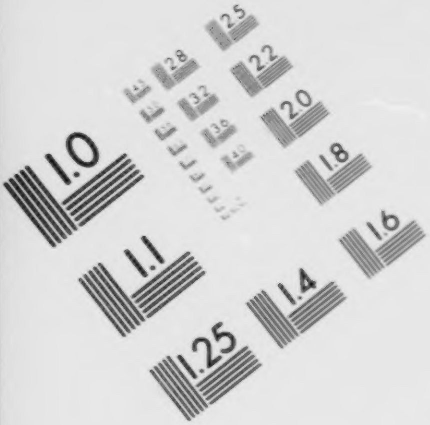
- **efferent or motor** — transmit messages from the central nervous system to all parts of the body

OBJECTIVE 7

Arrange in order the mechanisms of peripheral nerve regeneration.

NOTE: Neurons do not multiply as other cells do to replace those destroyed by injury or disease. The nerve fiber can regenerate only if the cell body is intact.




1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0

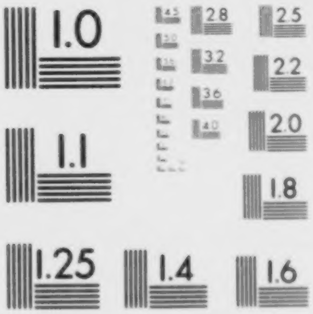
AIIM

Association for Information and Image Management

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910
301/587-8202

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0

Centimeter
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
mm
1
2
3
4
5
Inches


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0

1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0

MANUFACTURED TO AIIM STANDARDS
BY APPLIED IMAGE, INC.

1. The part of the fiber separated from the cell body disintegrates.

2. Neurilemma starts to regenerate at the site of injury.

   NOTE: If the cut ends of the neurilemma are not too far apart, they grow together to re-establish the neurilemmal tube.

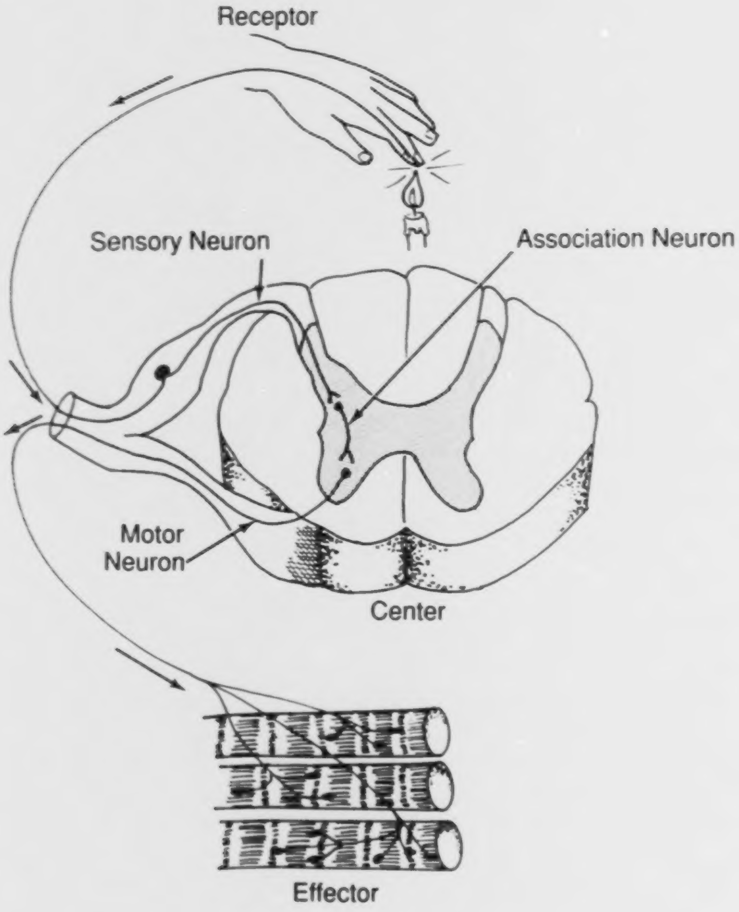
3. The remaining stump of the axon attached to the cell body is able to grow in the repaired tube.

NOTE: A surgeon may be able to aid in the regeneration process by aligning the cut ends of a nerve and, in some cases, the gap of injury can be spanned by artificial tubes. The regeneration process is slow, with an approximate rate of 1.5 mm per day.

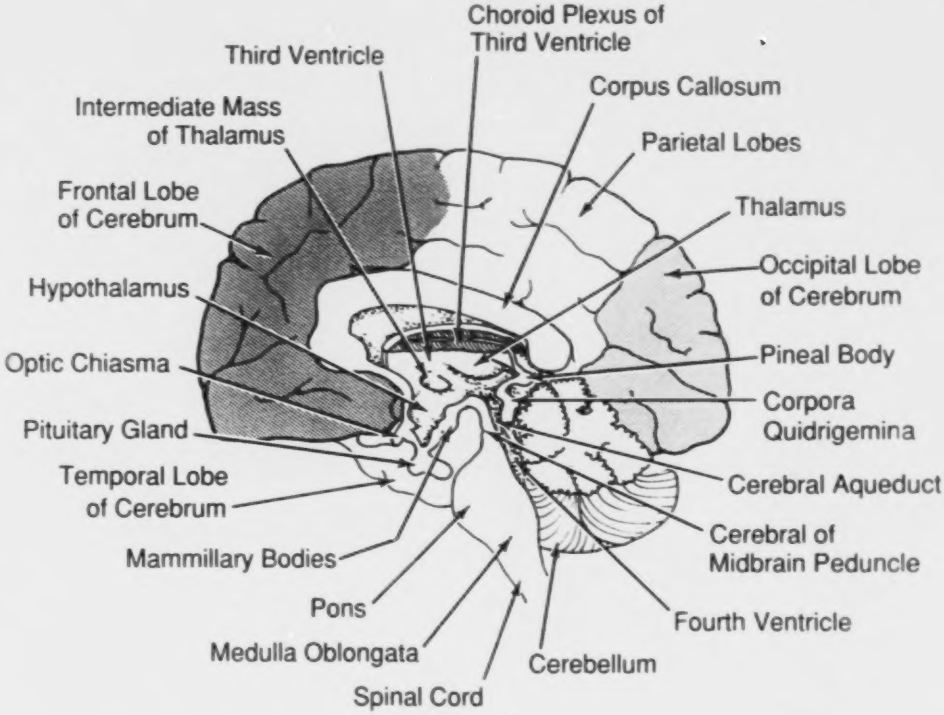
OBJECTIVE 8

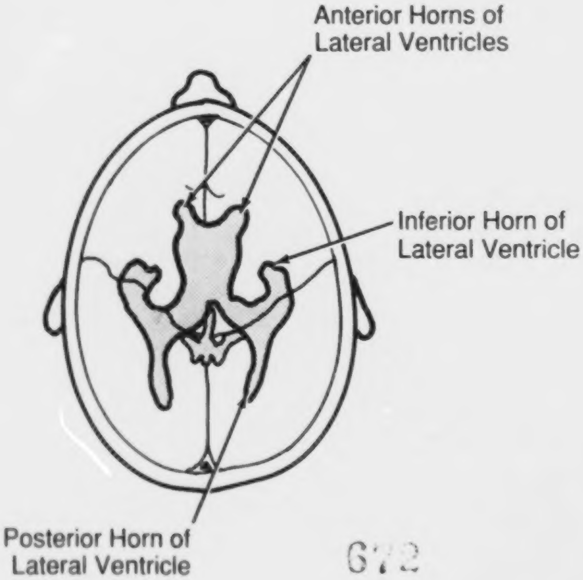
Write the sequence of basic nerve transmission.

1. Stimulus affects the free endings of the afferent neuron.
2. The impulse travels up the dendrite, through the cell body, to the axon.
3. The impulse travels through the axon, then across the symopse to the dendrite of the next nerve.
4. The impulse is relayed, nueron to neuron, to a central neuron.
5. The impulse is relayed to the central nervous system, and at the same time, to efferent neuron dendrites.
6. The reaction impulse travels through the dendrites to the cell body, through the cell body to the axon, and through the axon to the synapse and to other efferent neurons.
7. The impulse travels through an axon to the motor end plates embedded in muscle fiber, resulting in a physical reaction.


Receptor
Sensory Neuron
Association Neuron
Motor Neuron
Center
Effector

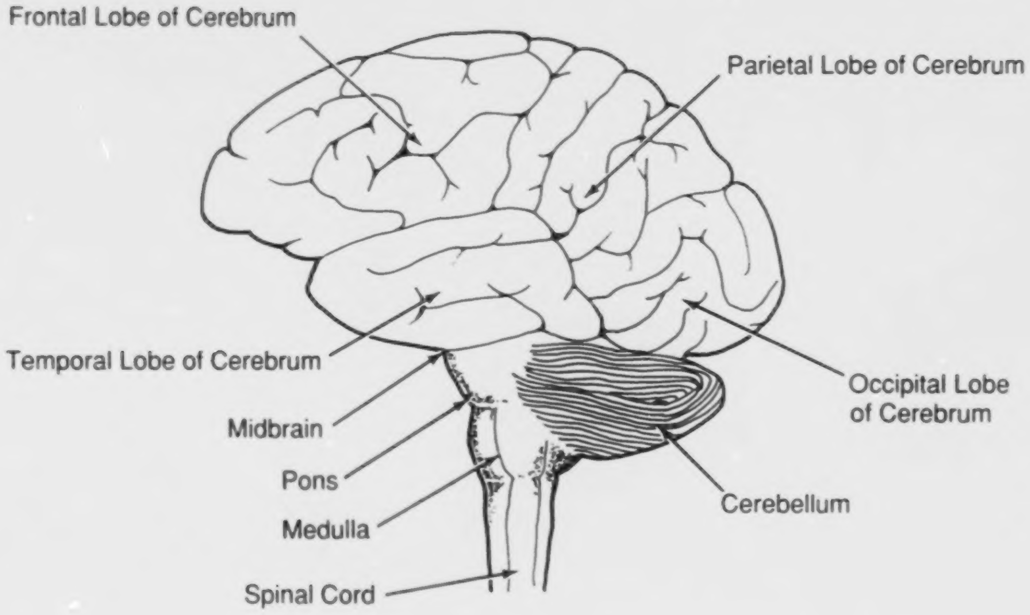
OBJECTIVE 9 | **Label the main structures of the central nervous system.**


Choroid Plexus of Third Ventricle
Third Ventricle
Corpus Callosum
Intermediate Mass of Thalamus
Parietal Lobes
Frontal Lobe of Cerebrum
Thalamus
Occipital Lobe of Cerebrum
Hypothalamus
Pineal Body
Optic Chiasma
Corpora Quidrigemina
Pituitary Gland
Temporal Lobe of Cerebrum
Cerebral Aqueduct
Cerebral of Midbrain Peduncle
Mammillary Bodies
Pons
Fourth Ventricle
Medulla Oblongata
Cerebellum
Spinal Cord

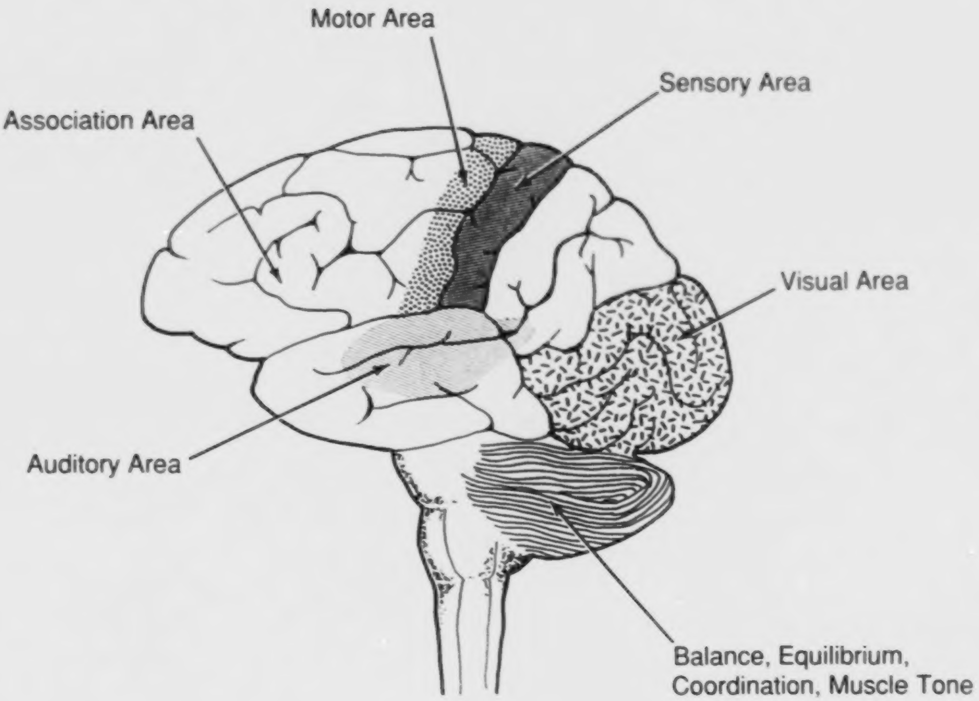

Anterior Horns of Lateral Ventricles
Inferior Horn of Lateral Ventricle
Posterior Horn of Lateral Ventricle

672

OBJECTIVE 10 | **Label the external surface of the brain.**


Frontal Lobe of Cerebrum
Parietal Lobe of Cerebrum
Temporal Lobe of Cerebrum
Occipital Lobe of Cerebrum
Midbrain
Pons
Medulla
Cerebellum
Spinal Cord

OBJECTIVE 11 | **Label the functional areas of the brain.**


Motor Area
Sensory Area
Association Area
Visual Area
Auditory Area
Balance, Equilibrium, Coordination, Muscle Tone

OBJECTIVE 12

Match parts of the brain to their functions.

NOTE: The left side of the brain controls the right side of the body, and the right side of the brain controls the left side of the body. The top of the brain controls the lower protion of the body; bottom controls the top of the body.

- **brain stem** – the bottom portion of the brain that contains the medulla, pons, midbrain, and thalamus; the enlarged portion of the spinal cord where it joins the brain
- **cerebellum** – controls balance, equilibrium, coordination, and muscle tone
- **frontal lobe of cerebrum** – controls voluntary muscles and judgement
- **grey matter** – non-myelinated nervous tissue; primarily the bodies of nerve cells
- **hypothalamus** – controls body temperature, water balance, sleep, appetite, emotions such as fear and pleasure, and both divisions of the autonomic nervous system

  NOTE: The thalamus and hypothalamus are located between the cerebrum and the midbrain in an area known as the diencephalon, a division of the forebrain.

- **medulla** – controls vital functions, such as breathing, heart rate, blood pressure, swallowing, and coughing

  NOTE: This is the site of ninth, tenth, eleventh, and twelfth cranial nerves.

- **midbrain** – serves as a reflex center
- **myelin sheath** — fatty covering that protects by providing insulation and speeds impulse conduction

  NOTE: Nerve fibers covered with myelin are called myelinated. Myelin sheath gives a white appearance to white matter; in contrast, grey matter is non-myelinated.

- **neurilemma** – thin membrane with nuclei called Schwann cells completely covering the nerve fiber; regenerates nerve fibers
- **occipital lobe of cerebrum** – controls vision
- **parietal lobe of cerebrum** – controls sensory functions, such as pain, touch, and temperature interpretation

- **pons** – connects the cerebrum and cerebellum

  NOTE: This is the site of fifth, sixth, seventh, and eighth cranial nerves.

- **temporal lobe of cerebrum** – controls hearing, smell, and taste

- **thalamus** – serves as a relay center; monitors sensory stimuli

- **white matter** – nervous tissue composed of myelinated nerve fibers

OBJECTIVE 13

Choose the word or phrase that completes statements about vessels that supply blood to the brain.

The brain needs approximately 15% of the total output of the heart for normal function. Either too little oxygen or too much carbon dioxide causes dilation of the arteries of the brain, permitting more blood to reach the brain. If the blood supply is halted for 6-10 minutes, irreversible changes take place.

- Four arteries (two internal carotids and two vertebral vessels) unite to form the Circle of Willis at the base of the brain.

- Circular arrangement of the arteries equalizes the circulation of blood and provides an alternate passageway for blood in case of blockage of one of the arteries.

OBJECTIVE 14

Select from a list functions of the spinal cord.

- Conducts impulses to and from the brain

- Serves as a reflex center to receive and transmit messages through nerve fibers

OBJECTIVE 15

List sources of protection for the central nervous system.

- **Bone** — The brain lies within the cranial cavity. The spinal cord is surrounded by vertebrae.

- **Membrane** — The meninges cover the brain and spinal cord in one continuous sheath.

- **Fluid** — Cerebrospinal fluid bathes and cushions the entire brain and spinal cord.

OBJECTIVE 16

Match the protective layers of the brain and spinal cord to their descriptions.

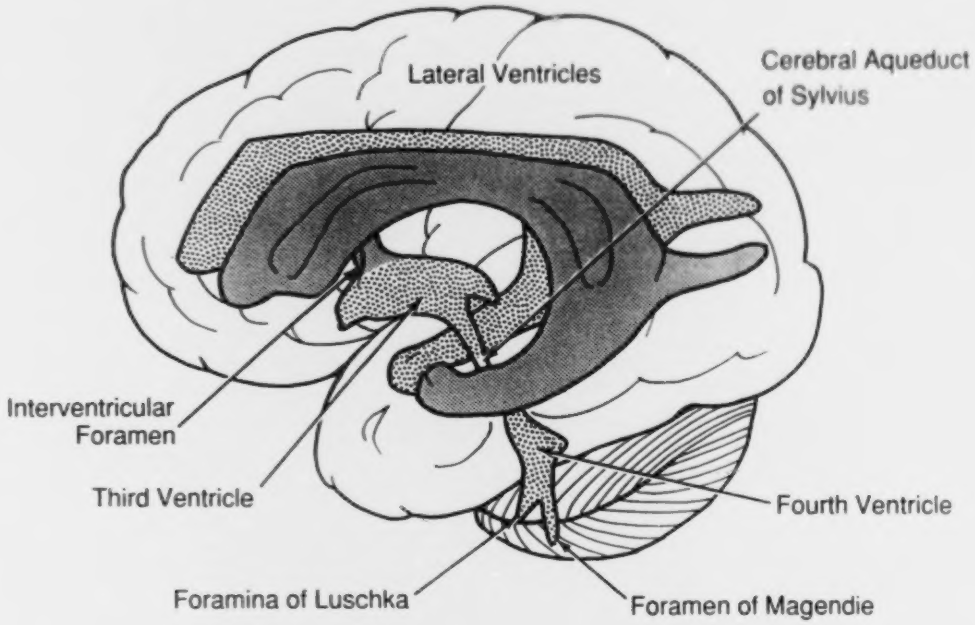
There are three cerebrospinal meninges, the dura mater, arachnoid, and pia mater. The layers are separated by subdural and subarachnoid spaces.

- **dura mater** – tough, fibrous outer layer
- **subdural space** – area between the dura mater and arachnoid
- **arachnoid** – middle layer lined with web-like fibrous strands that keep it separated from the pia mater
- **subarachnoid space** – area between the anachnoid and pia mater. The fibrous strands create a channel where the cerebrospinal fluid circulates.
- **pia mater** – transparent inner layer containing many blood vessels

OBJECTIVE 17

Choose the word or phrase that completes statements about the formation, purpose, and absorption of cerebrospinal fluid.

- Fluid is formed constantly by filtration from the blood in the capillaries of the brain and in the ventricles.


Lateral Ventricles
Cerebral Aqueduct of Sylvius
Interventricular Foramen
Third Ventricle
Fourth Ventricle
Foramina of Luschka
Foramen of Magendie

- The purpose of the fluid is to maintain an even pressure and act as a cushion or shock absorber by circulating around the brain and spinal cord.
- Fluid is continually absrobed by the blood vessels to maintain constant volume, pressure, and composition.

THE AUTONOMIC NERVOUS SYSTEM

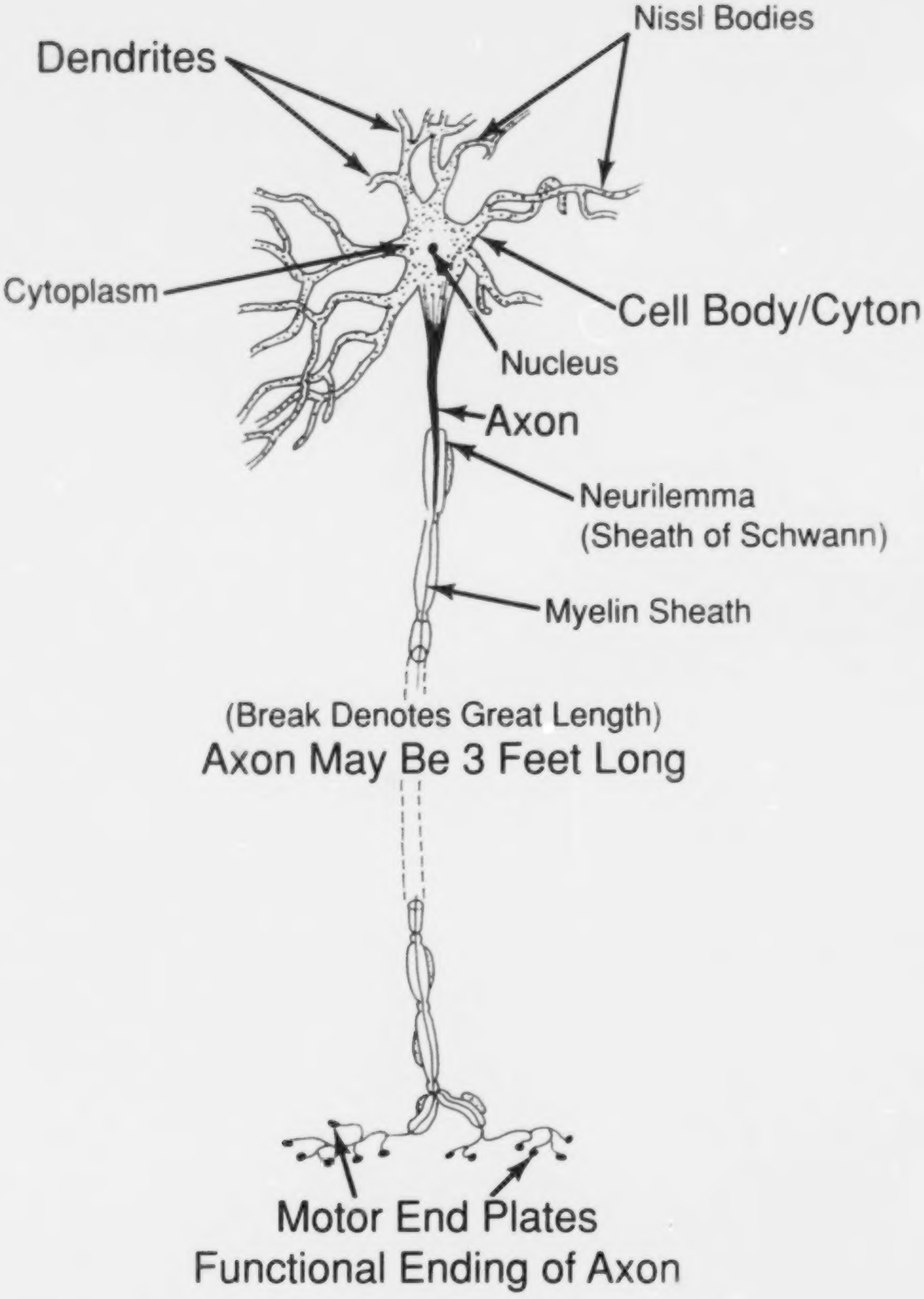
Despite its name, the autonomic nervous system (ANS) is not autonomous (meaning self-governing) and does not act independently of the central nervous system. Furthermore, it is not actually a separate nervous system. It functions as part of the central nervous system and as part of the peripheral nervous system. Unit XIV, *The Peripheral Nervous System* will also discuss the structure and function of the ANS.

The cerebral cortex, the medulla oblongata, and particularly the hypothalamus regulate the ANS. ANS nerve fibers are connected to nerve fibers in both the cerebral cortex and the spinal cord. The sympathetic and the parasympathetic divisions of the ANS are both connected to the hypothalamus. The autonomic nervous system is entirely motor, affecting the muscles and the glands, and its responses to the CNS occur through the peripheral nervous system.

Conscious effort can affect ANS functioning at the cerebral cortex. Several methods have been used to alter ANS responses such as slowing the heart rate, reducing blood pressure, or decreasing muscle tension. Researchers have found that biofeedback (a process that enables people to monitor how their organs function and to consciously control them), yoga (techniques for physical relaxation and relaxed, mental alertness), and transcendendal meditation (a method for achieving a highly relaxed state of mind and higher consciousness) can affect autonomic responses to stimulation.

Therapeutic uses of conscious control with these methods include reducing stress; decreasing the pain of migraine headaches; making childbirth easier; aiding in neuromuscular rehabilitation; and treating asthma, Raynaud's disease, hypertension and gastrointestinal disorders.

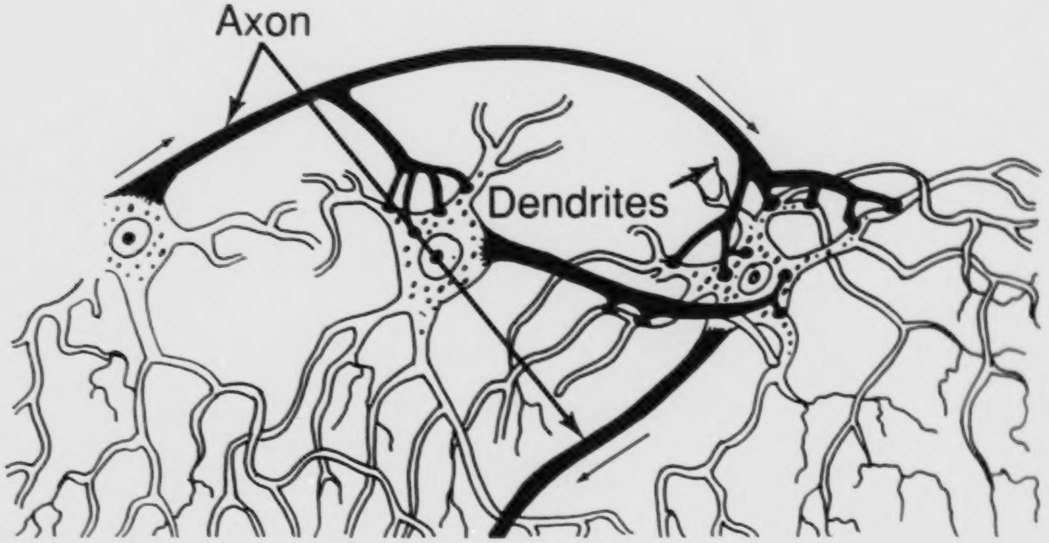
A Typical Neuron


Nissl Bodies
Dendrites
Cytoplasm
Cell Body/Cyton
Nucleus
Axon
Neurilemma
(Sheath of Schwann)
Myelin Sheath
(Break Denotes Great Length)
Axon May Be 3 Feet Long
Motor End Plates
Functional Ending of Axon

680

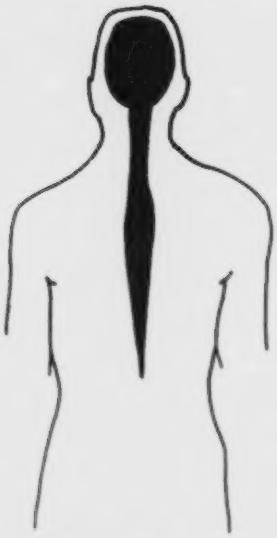
A Synapse

Synapse: Ends of Axons Contact Dendrites or Cell Bodies of Other Cells for Transmission of Impulses

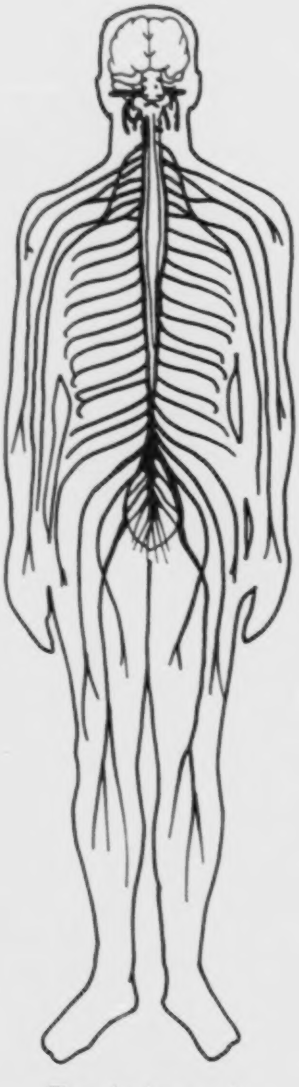


TRANSPARENCY MASTER 2 · Body Structure and Function
CIMC XIII · 29

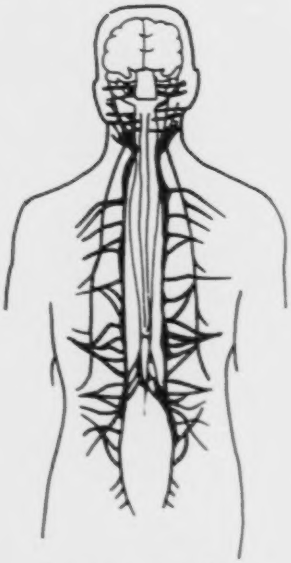
Human Nervous System



Central

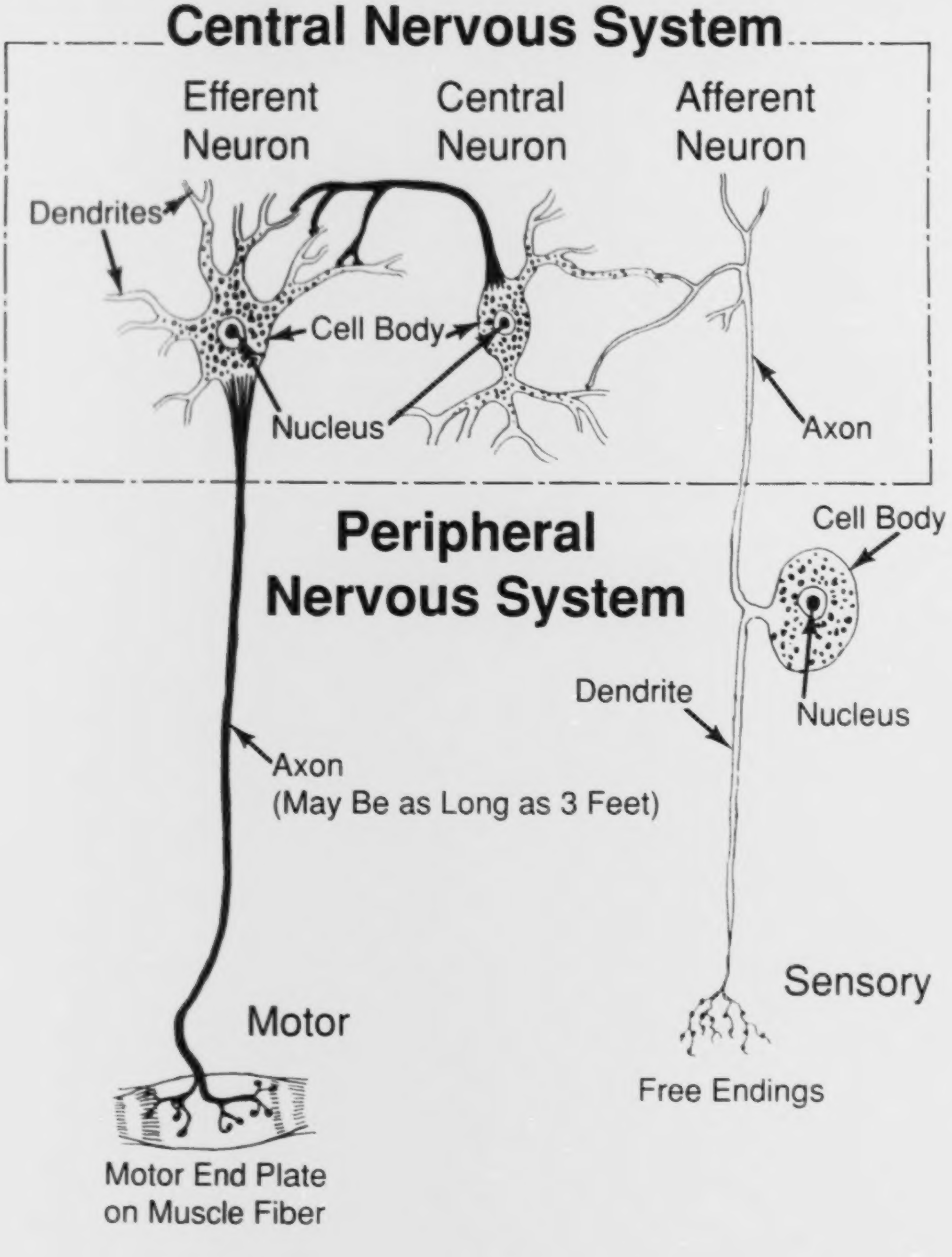


Peripheral



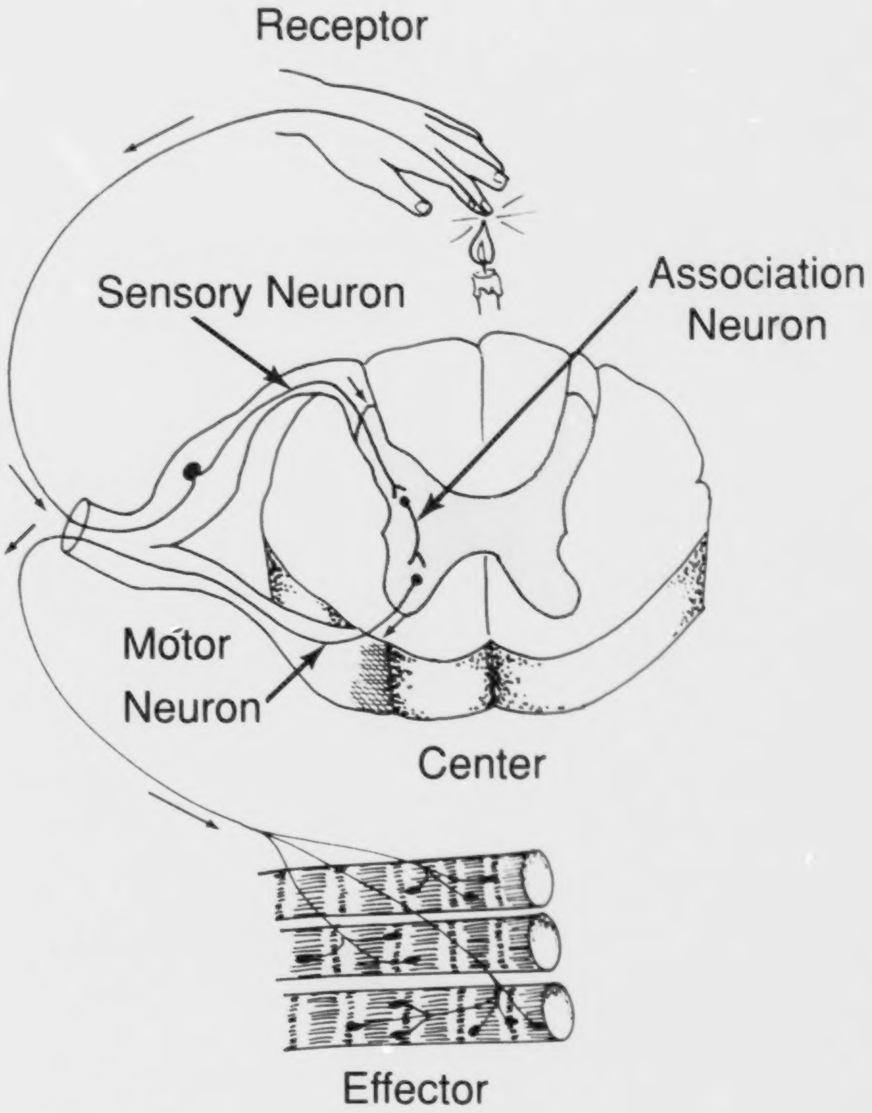
Autonomic

Sensory, Central, and Motor Neurons


Central Nervous System
Efferent Neuron
Central Neuron
Afferent Neuron
Dendrites
Cell Body
Nucleus
Axon
Peripheral Nervous System
Cell Body
Nucleus
Dendrite
Axon
(May Be as Long as 3 Feet)
Motor
Sensory
Free Endings
Motor End Plate on Muscle Fiber

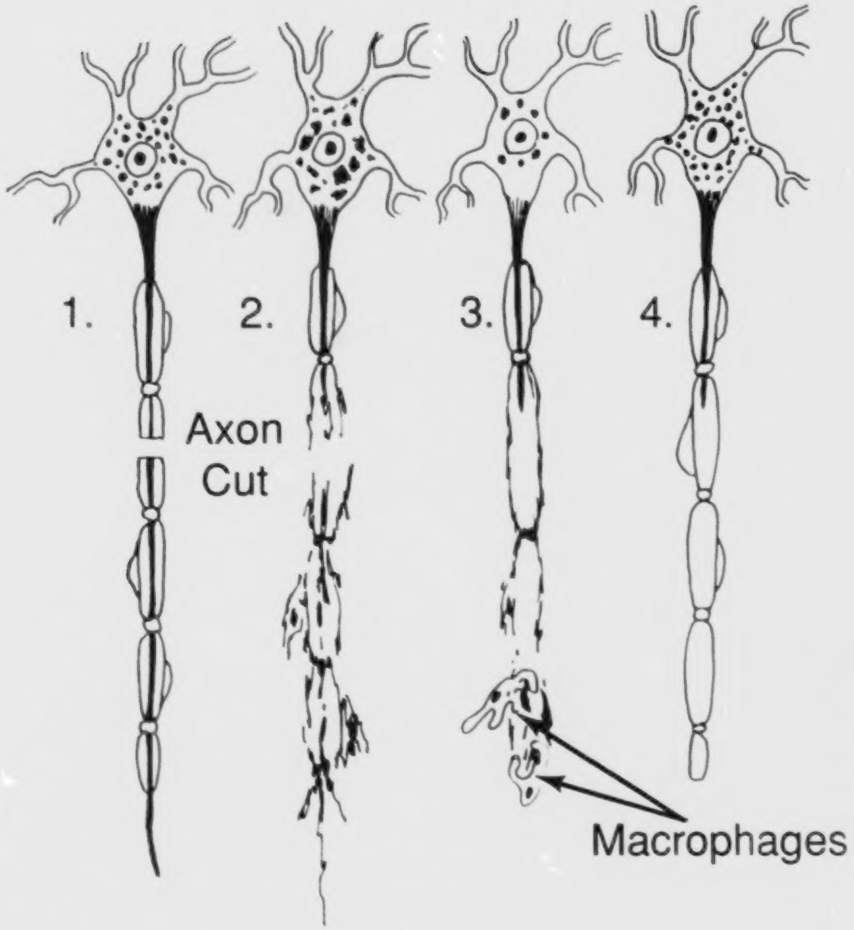
684

Reflex Arc


Receptor
Sensory Neuron
Association Neuron
Motor Neuron
Center
Effector

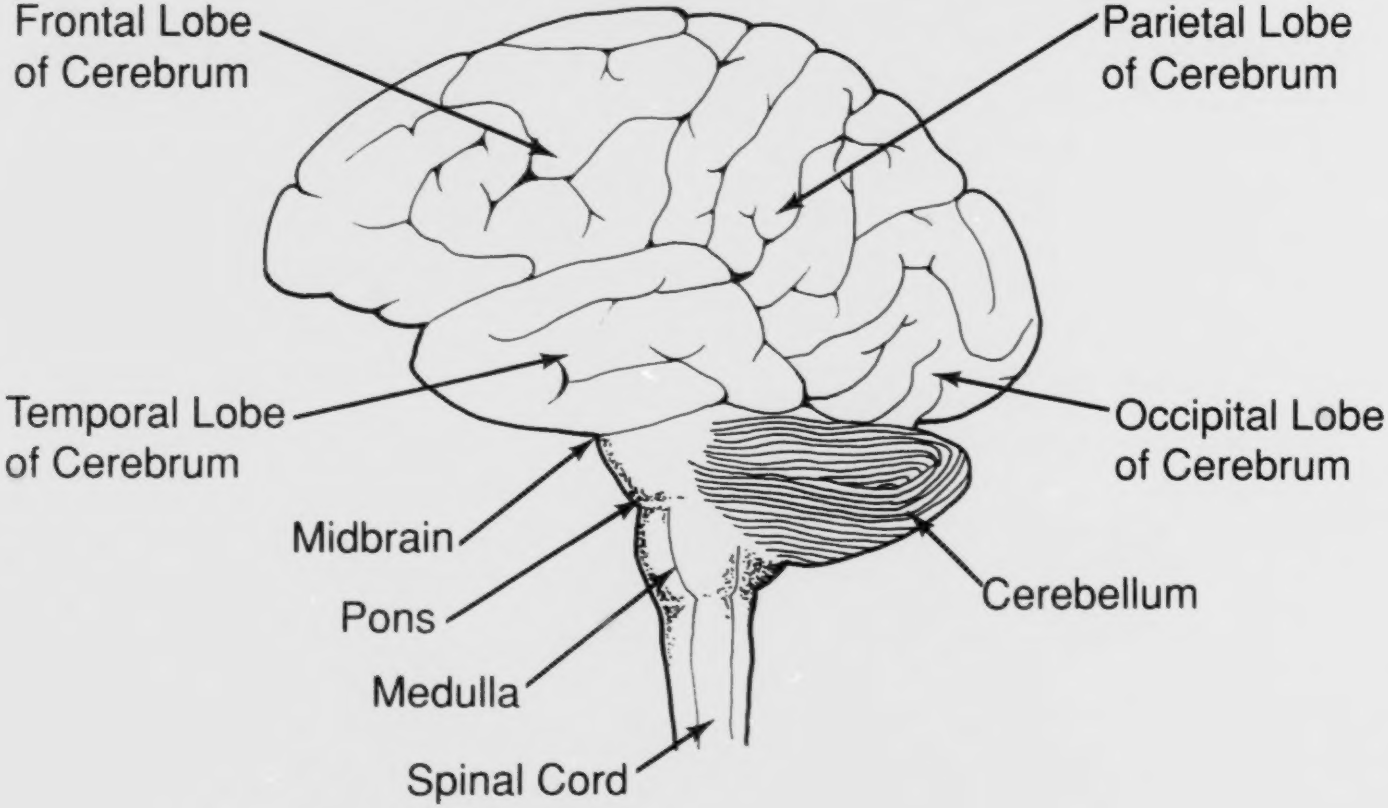
685

Regeneration of a Nerve Fiber


1.
2.
3.
4.
Axon
Cut
Macrophages

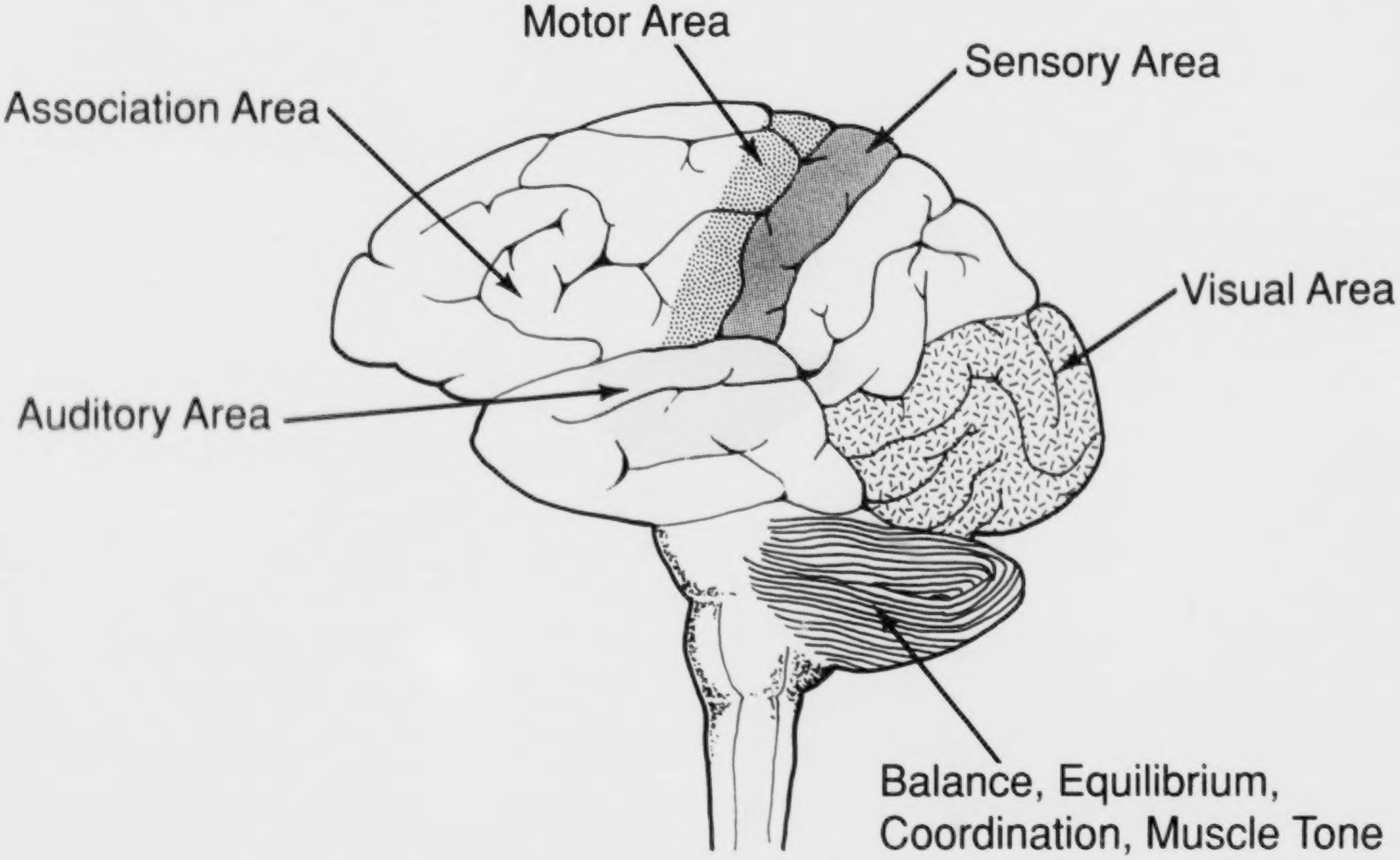
686

External Surface of the Brain


Frontal Lobe of Cerebrum
Parietal Lobe of Cerebrum
Temporal Lobe of Cerebrum
Occipital Lobe of Cerebrum
Midbrain
Pons
Medulla
Cerebellum
Spinal Cord

TRANSPARENCY MASTER 7 · Body Structure and Function
CIMC · XIII · 39

Functional Areas of the Brain


Motor Area
Sensory Area
Association Area
Visual Area
Auditory Area
Balance, Equilibrium, Coordination, Muscle Tone

TRANSPARENCY MASTER 8 Body Structure and Function
CIMC - XIII - 41

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.
- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization
  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language
  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing self confidence/esteem

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

691

  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.
  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.
  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.
  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:
  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.
  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).
  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.
  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

692

- If students have difficulty using effective body language:
  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.
  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.
- If students have difficulty adapting their presentation to a specific audience:
  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.
  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.
- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

- If students have difficulty developing self confidence/esteem:
  - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.
  - Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.
  - Allow the students to work in heterogenous groups to enable the less confident students to learn fron the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE CENTRAL NERVOUS SYSTEM

XIII

Name ______________________________ Score ___________

OBJECTIVE 18

Communicate about how the central nervous system works.

INTRODUCTION

The central nervous system allows us to control our body and actions, react to stimuli, and be aware of the world around us. It is an amaxingly complex system, capable of transmitting, processing, and responding to many different things at the same time. To be effective, a health care professional must clearly understand how the central nervous system works.

DIRECTIONS

Create a poster, pamphlet, or skit discussing how the central nervous system works and present the project to your class

Language Skills

- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills

- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills

- Create a finished product (written, oral, practical)

THE CENTRAL NERVOUS SYSTEM

Information should be accurate and directly relate to Central Nervous System. Presentation should follow HOSA guidelines.

THE CENTRAL NERVOUS SYSTEM

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with the central nervous system to their definitions. Write the letters in the blanks.

Part I

_____ 1. Thread-like projections of cytoplasm from the cell body of a neuron; axons and dendrites

_____ 2. Automatically regulates the action of the glands, the smooth muscles of hollow organs, and the heart, often without one's awareness

_____ 3. Supporting structure for nerve tissue consisting of blood vessels, connective tissue, and specialized cells

_____ 4. Consists of nerve tissues that form the brain and spinal cord; controls voluntary acts

_____ 5. The outer layer of gray matter of the cerebrum

_____ 6. Cell body that acts as a sending and receiving center, carries on metabolism, and stores energy

_____ 7. Basic nerve cell

_____ 8. The junction of an axon and one or more dendrites

a. autonomic nervous system

b. axon

c. central nervous system

d. cerebral cortex

e. cyton

f. effector

g. nerve fibers

h. neuroglia

i. neurology

j. neuron

k. regeneration

l. synapse

May be photocopied for student use

097

Part II

_____ 1. Motor nerve endings that carry out actions

_____ 2. The study of the nervous system

_____ 3. The part of the neuron that carries impulses to the cell body

_____ 4. Any agent or influence that produces a response or increase in activity in living protoplasm

_____ 5. Bundle of nerve cells within the central nervous system

_____ 6. Nerves that function in the reception of stimuli; the receiving end of sensory nerves

_____ 7. Provides input from sensory receptors to the central nervous systemand output from the central nervous system to effectors

a. affector

b. dendrite

c. effector

d. meninges

e. myelin

f. nerve tract

g. neuroiogy

h. peripheral nervous system

i. stimulus

j. ventricles

May be photocopied for student use.

Part III

_____ 1. Repair, regrowth, or restoration of a part

_____ 2. A substance that forms a sheath around the axons of some nerves

_____ 3. Large cavities of the brain

_____ 4. Pertaining to the back of the head

_____ 5. Part of the neuron that conducts impulses to the cell body

_____ 6. The membranes covering the brain and spinal cord

_____ 7. Watery fluid found in the ventricles of the cerebrum and surrounding the spinal cord

a. affector

b. axon

c. cerebral cortex

d. cerebrospinal fluid

e. effector

f. meninges

g. myelin

h. occipital

i. regeneration

j. ventricles

OBJECTIVE 2

Select from a list functions of the nervous system. Write an "X" in the blanks before functions.

_____ 1. Reception of external stimuli

_____ 2. Distribution of hormones

_____ 3. Mechanisms of movement

_____ 4. Coordination of interanl messages

_____ 5. Response and readjustment to internal and external stimuli

_____ 6. Memory

_____ 7. Distribution of nutrients

_____ 8. Coordination of all body activities

May be photocopied for student use.

OBJECTIVE 3

Distinguish among divisions of the nervous system. Write an "A" in the blanks before divisions of the autonomic nervous system; a "C" before divisions of the central nervous system; and a "P" before divisions of the peripheral nervous system.

_____ 1. Cranial nerves

_____ 2. Spinal nerves

_____ 3. Glandular action

_____ 4. Smooth muscles of hollow organs

_____ 5. Spinal cord

_____ 6. Cardiac muscle

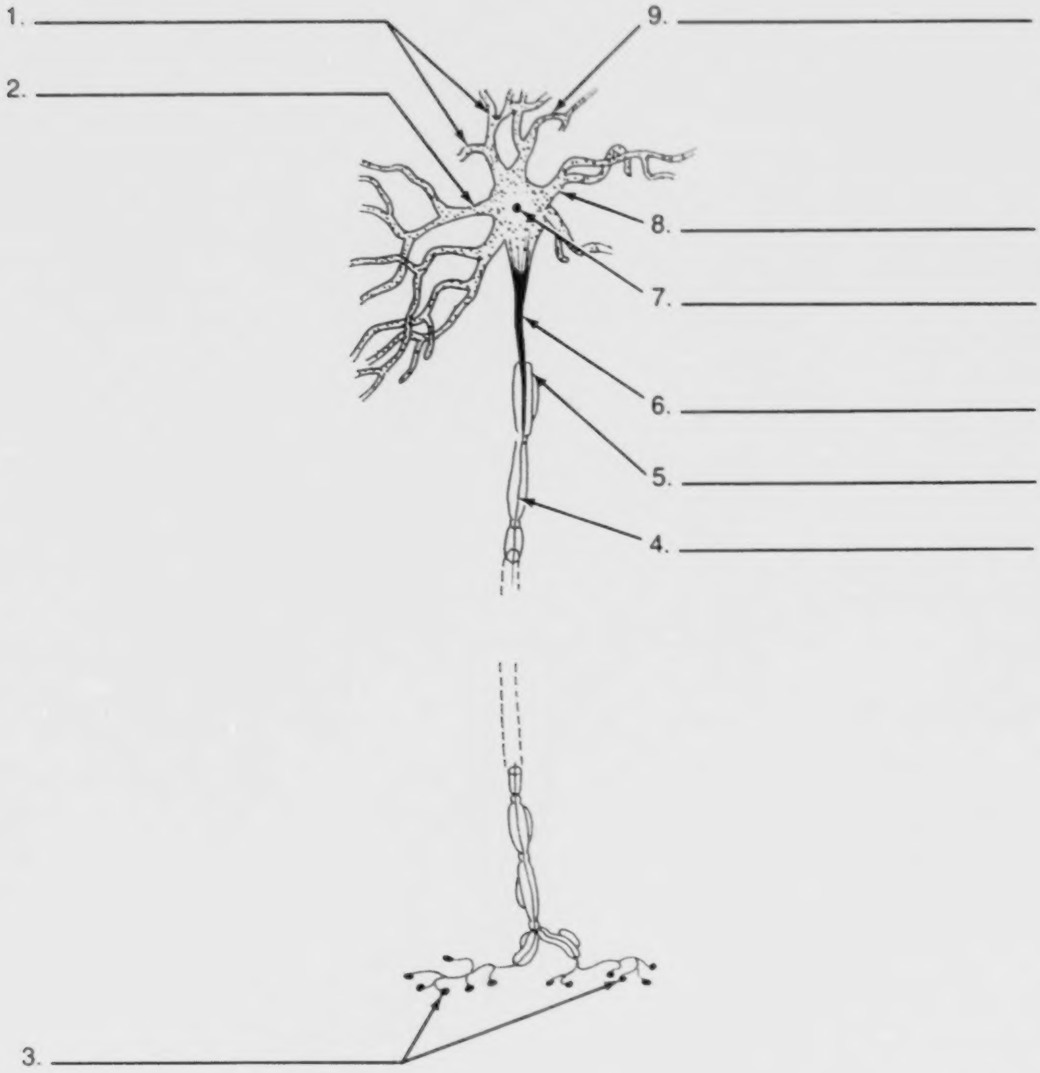
_____ 7. Brain

_____ 8. Brain stem

700

May be photocopied for student use.

OBJECTIVE 4 | **Label parts of a neuron.** Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 5

Match parts of a neuron to their description. Write the letters in the blanks.

_____ 1. The central structure of the cell in which characteristics are determined and transfered

_____ 2. The protion of the neuron containing the mucleus and cytoplasm

_____ 3. The casing around an axon that insulates the axon and speeds impuleses

_____ 4. Granules found in both the cell body and dendrites which are concerned with metabolism and protein synthesis

_____ 5. Transfers input away from the cell body

_____ 6. The thick fluid inside the cell, but outside the nucleus

_____ 7. The process or extension of a nerve cell that transfers input toward the cell body

_____ 8. The cell body of the Schwann cell surrounding the axon and forming the meylin sheath

_____ 9. The end of the axon in which neurotransmitters are stored and from which they are sent to continue the nerve impulses

a. axon
b. cell body
c. cytoplasm
d. dendrites
e. motor end plates
f. myelin sheath
g. neuralgia
h. neurilemma
i. nissl bodies
j. nucleic body
k. nucleus
l. protoplasm
m. terminal plates

May be photocopied for student use.

OBJECTIVE 6

Match types of neurons to their functions. Write the letters in the correct blanks.

_____ 1. Receive messages from all parts of the body and transmit them to the central nervous system

_____ 2. Conduct messages or impulses from sensory to motor nerves

_____ 3. Transmit messages from the central nervous system to all parts of the body

a. afferent or sensory

b. efferent or motor

c. interefferent or cycling

d. internuncial, central, or connecting

e. affluent or locating

OBJECTIVE 7

Arrange in order the mechanisms of peripheral nerve regeneration. Write a "1" in the blank before the first mechanism, a "2" in the blnak before the second, etc.

_____ 1. The remaining stump of the axon attached to the cell body is able to grow in the repaired tube.

_____ 2. Neurilemma starts to regenerate at the site of injury.

_____ 3. The part of the fiber separated from the cell body disintegrates.

OBJECTIVE 8

Write the sequence of basic nerve transmission. Describe each step in basic nerve transmission.

____

____

____

____

____

____

____

____

____

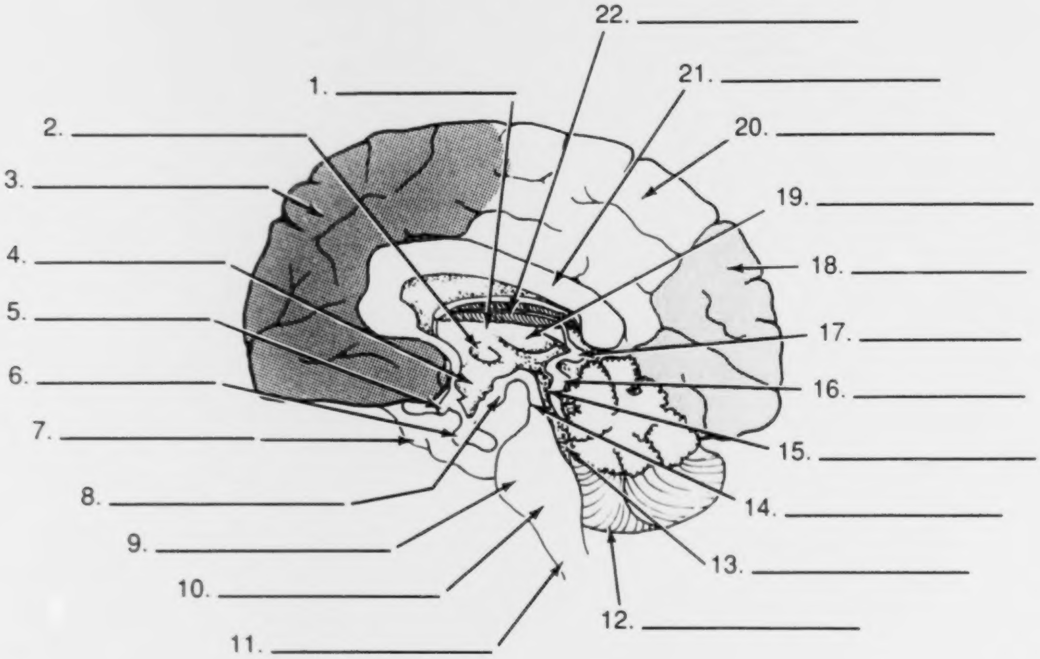
____

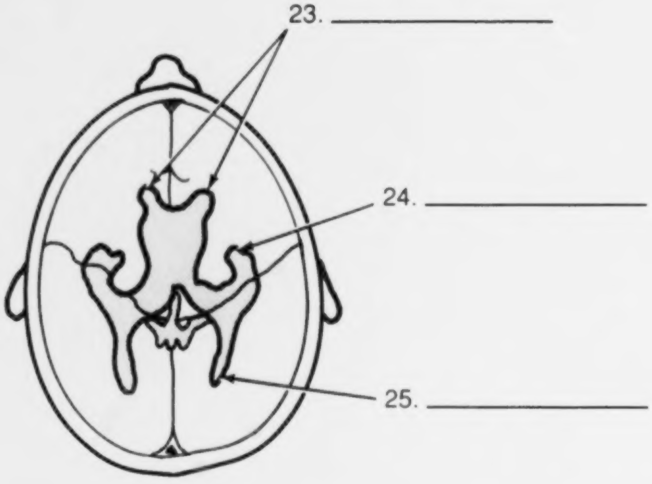
May be photocopied for student use.

May be photocopied for student use.

704

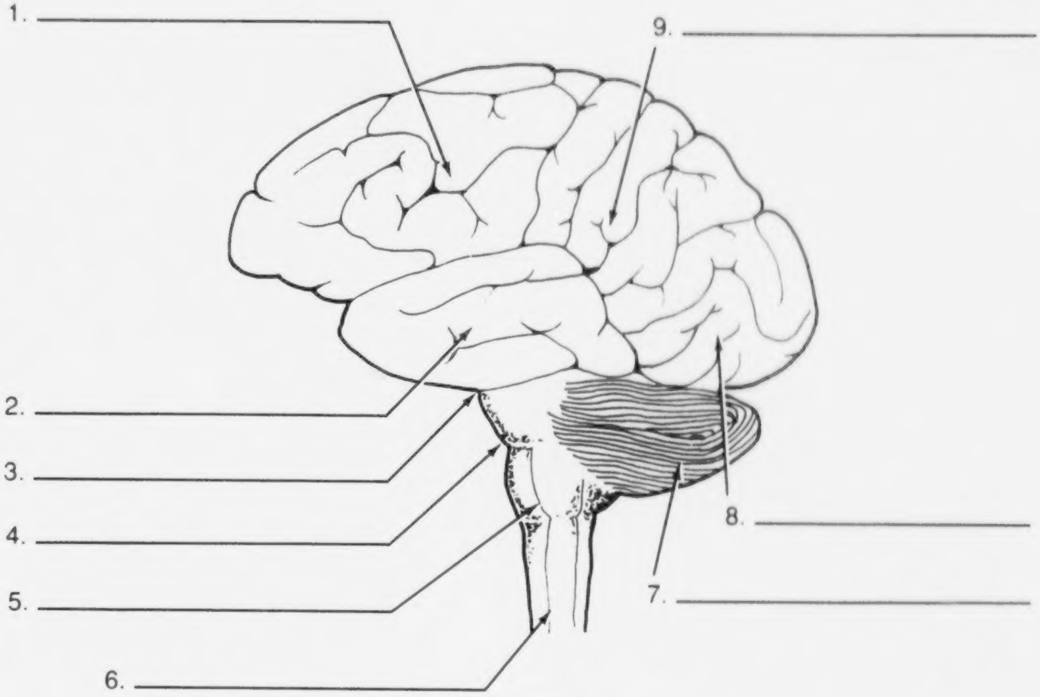
OBJECTIVE 9 | **Label the main structures of the central nervous system.**


1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ____________
11. ____________
12. ____________
13. ____________
14. ____________
15. ____________
16. ____________
17. ____________
18. ____________
19. ____________
20. ____________
21. ____________
22. ____________



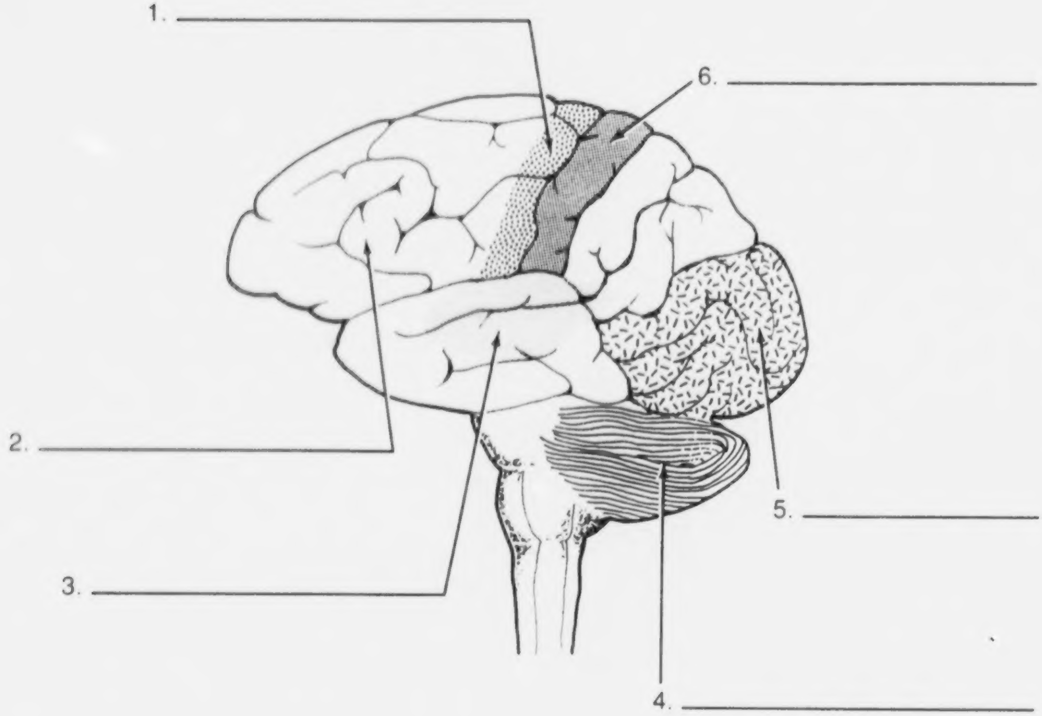
May be photocopied for student use.

OBJECTIVE 10 | **Label the external surface of the brain.** Write the names in the blanks.



May be photocopied for student use.

OBJECTIVE 11 | **Label the functional areas of the brain.** Write the names in the blanks.



May be photocopied for student use 707

OBJECTIVE 12

Match parts of the brain to their functions. Write the correct letter in the blank.

Part I

_____ 1. Serves as a relay center; monitors sensory stimuli

_____ 2. Controls vital functions, such as breathing, heart rate, blood pressure, swallowing, and coughing

_____ 3. Serves as a reflex center

_____ 4. Controls vision

_____ 5. The bottom portion of the brain that contains the medulla, pons, midbrain, and thalamus; the enlarged portion of the spinal cord where it joins the brain

_____ 6. Controls sensory functions, such as pain, touch, and temperature interpretation

_____ 7. Controls balance, equilibrium, coordination, and muscle tone

_____ 8. Connects the cerebrum and cerebellum

a. brain stem
b. cerebellum
c. gray matter
d. medulla
e. midbrain
f. myelin sheath
g. neurilemma
h. occipital lobe of cerebrum
i. parietal lobe of cerebrum
j. pons
k. temporal lobe of cerebrum
l. thalamus

May be photocopied for student use

Part II

_____ 1. Controls voluntary muscles and judgement

_____ 2. Controls hearing, smell, and taste

_____ 3. Controls body temperature, water balance, slepp, appetite, emotions such as fear and pleasure, and both divisions of the autonomic nervous system

_____ 4. Non-myelinated nervous tissue; primarily the bodies of nerve cells

_____ 5. Fatty covering that protects by providing insulation and speeds impulse conduction

_____ 6. Nervous tissue composed of myelinated nerve fibers

_____ 7. Thin membrane with nuclei called Schwann cells completely covering the nerve fiber; regenerates nerve fibers

a. brain stem

b. frontal lobe of cerebrum

c. gray matter

d. hypothalamus

e. midbrain

f. meylin sheath

g. neurilemma

h. parietal lobe of cerebrum

i. temporal lobe of cerebrum

j. white matter

May be photocopied for student use.

OBJECTIVE 13 **Choose the word or phrase that completes statements about vessels that supply blood to the brain.** Write the correct letter in the blank.

_____ 1. The Circle of Willis is made of

- a. three arteries (four internal carotids, and one vertebral vessel)
- b. four arteries (two internal carotids, and two vertebral vessels)
- c. Two arteries (three internal carotids, and four vertebral vessels)
- d. one vessel and one carotid

_____ 2. The arrangement of the arteries equalizes blood circulation and

- a. provides an alternate passageway for blood
- b. adjusts blood pressure
- c. controls blood distribution
- d. monitors blood composition

OBJECTIVE 14 **Select from a list true statements about functions of the spinal cord.** Write an "X" in blanks before true statements.

_____ 1. Filters input

_____ 2. Serves as a reflex center to receive and transmit messages through nerve fibers

_____ 3. Controls effectors

_____ 4. Conducts impulses to and from the brain

_____ 5. Produces marrow

OBJECTIVE 15 **List sources of protection for the central nervous system.**

____

____

____

May be photocopied for student use.

710

OBJECTIVE 16

Match the protective layers of the brain and spinal cord to their descriptions. Write the correct letters in the blanks.

_____ 1. Area between the dura mater and arachnoid

_____ 2. Area between the arachnoid and pia mater. The fibrous strands create a channel where the cerebrospinal fluid circulates.

_____ 3. Middle layer lined with web-like fibrous strands that keep it separated from the pia mater

_____ 4. Tough, fibrous outer layer

_____ 5. Transparent inner layer containing many blood vessels

a. arachnial space

b. arachnoid

c. dura mater

d. pia mater

e. pial space

f. subarachnoid space

g. subdural mater

h. subdural space

OBJECTIVE 17

Choose the word or phrase that completes statements about the formation, purpose, and absroption of cerebrospinal fluid. Write the correct letter in the blank.

_____ 1. Fluid is formed in the

a. capillaries and ventricles

b. cavities and ventricles

c. cavities and capillaries

d. cavities, capillaries, and ventricles

_____ 2. The purpose of the fluid is

a. maintaining an even pressure and acting as a shock absorber

b. maintaining an even pressure only

c. maintaining an even pressure and acting as an insulator

d. acting as a shock absorber and insulator

May be photocopied for student use

_____ 3. To maintain constant blood volume, pressure, and composition, fluid is constantly

a. circulated

b. condensed

c. absorbed

d. diluted

May be photocopied for student use

712

WRITTEN TEST ANSWERS

THE CENTRAL NERVOUS SYSTEM

XIII

OBJECTIVE 1

Part I	Part II	Part III
1. g	1. c	1. i
2. a	2. g	2. g
3. h	3. b	3. j
4. c	4. i	4. h
5. d	5. f	5. b
6. e	6. a	6. f
7. j	7. h	7. d
8. l		

OBJECTIVE 2

1, 4, 5, 6, 8

OBJECTIVE 3

1. P
2. P
3. A
4. A
5. C
6. A
7. C
8. C

OBJECTIVE 4

1. Dendrites
2. Cytoplasm
3. Motor end plates
4. Myelin sheath

713

5. Neurilemma or Sheath of Schwann
6. Axon
7. Nucleus
8. Cell body or cyton
9. Nisal bodies

OBJECTIVE 5

1. k
2. b
3. f
4. i
5. a
6. c
7. d
8. h
9. e

OBJECTIVE 6

1. a
2. d
3. b

OBJECTIVE 7

1. 3
2. 2
3. 1

OBJECTIVE 8

1. Stimulus affects the free endings of the afferent neuron.
2. The impulse travels up the dendrite, through the cell body, to the axon.
3. The impulse travels through the axon, then across the synapse to the dendrite of the next nerve.

4. The impulse is relayed, neuron to neuron, to a central neuron.

5. The impulse is relayed to the central nervous system, and at the same time, to efferent neuron dendrites.

6. The reaction impulse travels through the dendrites to the cell body, through the cell body to the axon, and through the axon to the synapse and to other efferent neurons.

7. The impulse travels through an axon to the motor end plates embedded in muscle fiber, resulting in a physical reaction.

OBJECTIVE 9

1. Third ventricle

2. Intermediate mass of thalamus

3. Frontal lobe of cerebrum

4. Hypothalamus

5. Optic chiasma

6. Pituitary gland

7. Temporal lobe of cerebrum

8. Mammillary bodies

9. Pons

10. Medulla oblongata

11. Spinal cord

12. Cerebellum

13. Fourth ventricle

14. Cerebral peduncle of midbrain

15. Cerebral aqueduct

16. Corpora quadrigemina or midbrain

17. Pineal body

18. Occipital lobe of cerebrum

19. Thalamus

715

20. Perietal lobe of cerebrum
21. Corpus callosum
22. Choroid plexus of third ventricle
23. Anterior horns of lateral ventricles
24. Inferior horns of lateral ventricles
25. Posterior horns of lateral ventricles

OBJECTIVE 10

1. Frontal lobe of cerebrum
2. Temporal lobe of cerebrum
3. Midbrain
4. Pons
5. Medulla
6. Spinal cord
7. Cerebellum
8. Occipital lobe of cerebrum
9. Parietal lobe of cerebrum

OBJECTIVE 11

1. Motor area
2. Association area
3. Auditory area
4. Balance, equilibrium, coordination, muscle tone
5. Visual area
6. Sensory area

216

OBJECTIVE 12

Part I		Part II	
1.	l	1.	b
2.	d	2.	i
3.	e	3.	d
4.	h	4.	c
5.	a	5.	f
6.	k	6.	j
7.	b	7.	g
8.	j		

OBJECTIVE 13

1. b
2. a

OBJECTIVE 14

2, 4

OBJECTIVE 15

Answers should include:

- Bone
- Membrane
- Fluid

OBJECTIVE 16

1. h
2. f
3. b
4. c
5. d

OBJECTIVE 17

1. a
2. a
3. c

OBJECTIVE SHEET

THE PERIPHERAL NERVOUS SYSTEM

XIV

INTRODUCTION

By now you realize how many things are happening in your body at any moment. Keeping track of and controlling these things would seem to be impossible, but that is what your nervous system does. The peripheral nervous system controls the involuntary actions of the body and passes information on to the central nervous system.

UNIT OBJECTIVE

After completing this unit the student will be able to identify the structure, function, and purpose of the peripheral nervous system and spinal cord. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the peripheral nervous system to their definitions.
2. List parts of the peripheral nervous system.
3. Define afferent and efferent impulses.
4. Label cranial nerves.
5. Match cranial nerves to their functions.
6. Arrange in order the steps in transmission through the reflex arc.
7. Describe the divisions of the autonomic nervous system.
8. Match parasympathetic and sympathetic effects to the associated organs and systems.
9. Communicate about how the peripheral nervous system works. (assignment sheet)

718

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Order materials to supplement unit. Models may be ordered from Health Edco, P.O. Box 21207, Waco, TX 76702-1207, 1-800-299-3366.
- Invite a neurologist, acupuncturist, or other professional to discuss characteristics of the nervous system.

  NOTE: Supply guest speakers with the Objective Sheet, Information Sheet and any other components you want them to cover.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.
  - Assist students in scheduling and presenting prepared and extemporaneous speeches.

- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the peripheral nervous system to their definitions.

- Review terms and definitions presented in Unit 13.

Objective 2: List parts of the peripheral nervous system.

- Compare cranial, spinal, and autonomic nerves.
- Compare the locations of cranial, spinal, and autonomic nerves, noting differences in surrounding organs and tissues, protection, and body movements.

Objective 3: Define afferent and efferent impulses.

- Explain the differences between "affect" and "effect," then "affecter" and "effector."
- Have students compare the different types of impulses to other items or processes. For example, placing a telephone call is "affecter," while receiving one is "effector."

Objective 4: Label cranial nerves.

Objective 5: Match cranial nerves to their functions.

- Have students brainstorm why so many cranial nerves control the eyes, eyeballs, or related structures.
- Have student diagram the cranial nerves, create poems, or use pneumonic devices to remember the different nerves and their functions. Have students share their devices with the class.

Objective 6: Arrange in order the steps in transmission through the reflex arc.

- Explain the difference between voluntary and reflex actions.
- Allow students to test some reflexes. Challenge them to control the reflexes voluntarily.

- Have students compare the paths of messages that are voluntary and involuntary.

Objective 7: Describe the divisions of the autonomic nervous system.

- Have students list physical reactions to the following emotions: anger, fear, excitement, surprise, lust, boredom.

- The sympathetic nervous system usually increases the action of a system or an organ. The digestive system, however, is usually shut down by the sympathetic system and activated by the parasympathetic system. Have students discuss why this is so.

- Have students bring stories related to the sympathetic and parasympathetic systems. Most will probably involve adrenalin production and feats of strength, but remind them about Pavlov's dogs, blushing, and yawning. Encourage stories about these reactions.

Objective 8: Match parasympathetic and sympathetic effects to the associated organs and systems.

- Tell students to remember that the parasympathetic system promotes peace, while the sympathetic system reacts to stress.

- Have students explain why various reactions are sympathetic or parasympathetic.

- Have students list actions that can be caused by either the sympathetic or parasympathetic.

APPLICATION

Objective 9: Communicate about how the peripheral nervous system works. (Assignment Sheet)

- Use the assignment sheet to relate nutrition to the peripheral nervous system.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.

- Give written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.

- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED RESOURCES

Electronic Media

- The following films are available from Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700.

  Anatomy and Physiology Filmstrips, The Nervous System, Unit 5. Filmstrip, cassette and instructor's guide.

  Human Systems Filmstrip Sets, Nervous System in the Human Body. Covers brain structure and function, nerve tissues and the skin-to-spine pathway. Filmstrip, cassette, and student self-instruction booklet.

  Your Body: Series III. Covers the nervous system and its parts and the brain. VHS video from filmstrip and teacher's guide.

Software

- The following software is available from Opportunities for Learning, Inc., 941 Hickory Lane, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 1-419-589-1700.

  Experiments in Human Physiology uses experiments to measure physiological responses. Includes software, teacher's guide, experiment instructions, interface box, temperature probes, timer plug, light and light sensor, and extender cables. For use on Apple computers, 48K.

  The Human Body: An Overview includes software, courseware kit, and teacher's guide (multiple choice, true-false, and short answer review). For use on Apple computers, 48K.

UNIT REFERENCES

- Crider, Andrew B., et all, *Psychology*, Scott, Foresman and Company, Glenview, IL, 1986.
- Duncan, Betty, *Allied Health Careers*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma, 1987.

722

- Rogers, Helen V., *Practical Nursing 1*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma, 1981.
- Rosdahl, Caroline Bunker, *Textbook of Basic Nursing*, J. B. Lippincott Co., Philadelphia, 1981.

OBJECTIVE 1

Match terms associated with the peripheral nervous system to their definitions.

- **cranial nerves** – twelve pair of nerves that convey special and general sense impulses and control voluntary muscles, glands, and involuntary muscles
- **dermatome** – an area of skin supplied by a specific spinal nerve
- **reflex** – an automatic response to stimulus
- **reflex arc** – the short message route taken to process and react to stimuli and produce a reflex action

OBJECTIVE 2

List parts of the peripheral nervous system.

NOTE: See Objective 3, Unit XIII, *The Central Nervous System.*

Cranial nerves

- 12 pair
- Carry impulses to and from the brain

Spinal nerves

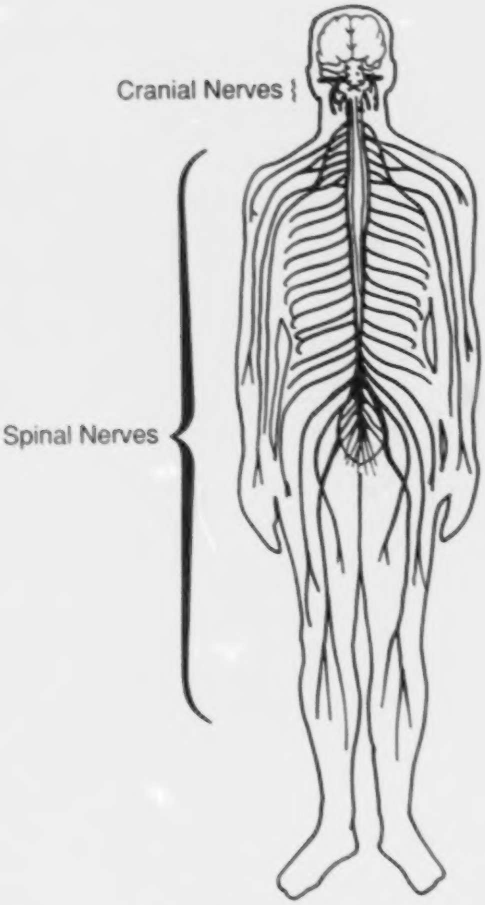
- 31 pair
- Carry messages to and from the spinal cord

Autonomic nerves (ganglia and fiber)

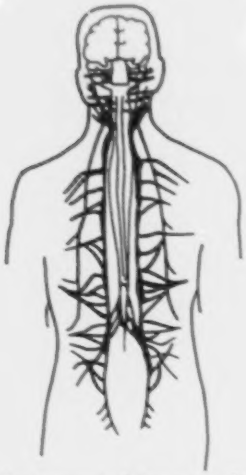
- Can be referred to as the autonomic nervous system
- Lie on either side of the spinal cord
- Has two subdivisions
  - – sympathetic division (thoracolumbar)
  - – parasympathetic division (craniosacral)

- Has to do largely with activities which go on more or less automatically
- Controlled by the hypothalamus

NOTE: Both divisions of the autonomic nervous system consist of two sets of neurons, preganglionic and postganglionic. Both are efferent.



Peripheral Nervous System

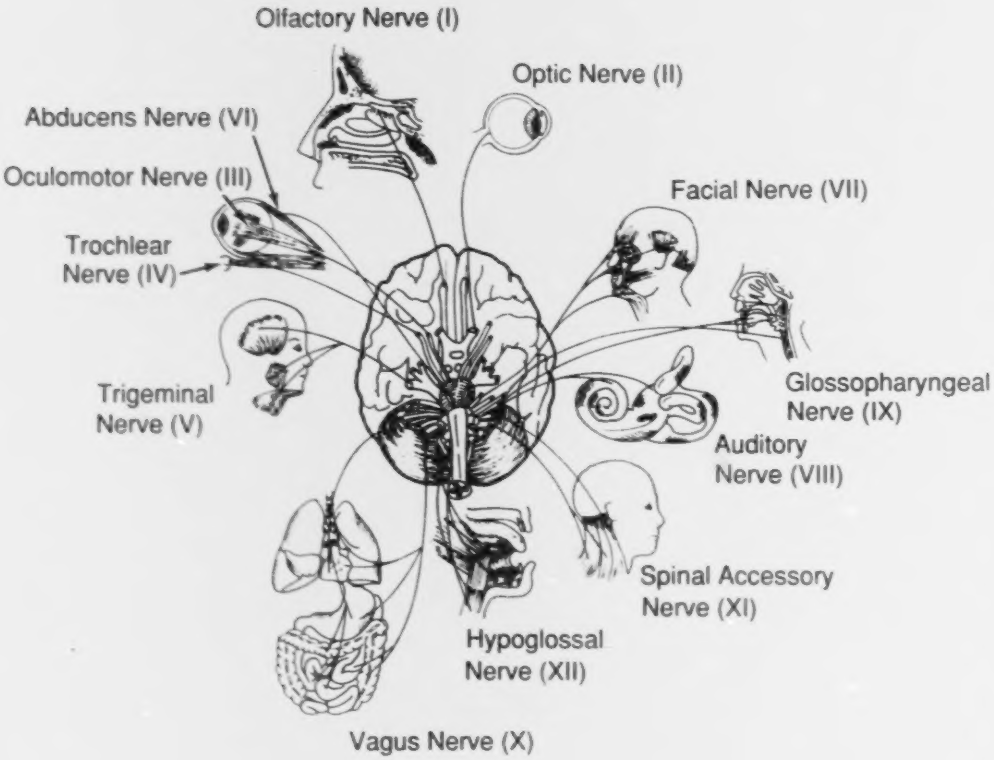


Autonomic Nervous System

OBJECTIVE 3 **Define afferent and efferent impulses.**

- **afferent (also called sensory or receptor impulses)** – impulses sent from all parts of the body to the central nervous system conveying information about the body status or environment
- **efferent (also called motor impulses)** – impulses sent from the central nervous system to all parts of the body conveying "instructions" for a change or reaction

OBJECTIVE 4 **Label cranial nerves.**


Olfactory Nerve (I)
Optic Nerve (II)
Abducens Nerve (VI)
Oculomotor Nerve (III)
Facial Nerve (VII)
Trochlear Nerve (IV)
Trigeminal Nerve (V)
Glossopharyngeal Nerve (IX)
Auditory Nerve (VIII)
Spinal Accessory Nerve (XI)
Hypoglossal Nerve (XII)
Vagus Nerve (X)

OBJECTIVE 5

Match cranial nerves to their functions.

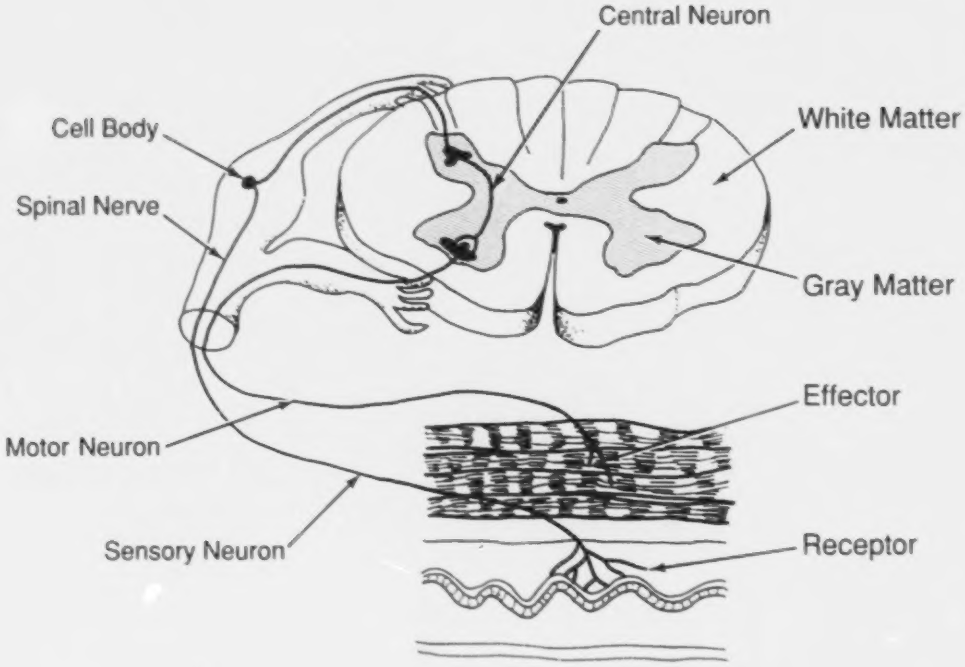
- **olfactory (I)** – sense of smell
- **optic (II)** – sense of sight
- **oculomotor (III)** – controls part of the eyeball muscles
- **trochlear (IV)** – controls one eyeball muscle
- **trigeminal (V)** – three branches supply cornea and conjunctive; upper portion of face, ear, lower lip, teeth, and gums; and muscles for chewing
- **abducens (VI)** – controls lateral eye movement
- **facial (VII)** – supplies facial muscles, middle ear, and taste
- **auditory (VIII)** – sense of hearing and balance
- **glossopharyngeal (IX)** – taste, swallowing
- **vagus (X)** – swallowing, hunger, speech muscles, breathing, heart rate, peristalsis, and control of glands in the stomach and pancreas
- **spinal accessory (XI)** – controls muscles of the neck and upper back
- **hypoglossal (XII)** – controls tongue muscles

OBJECTIVE 6

Arrange in order the steps in transmission through the reflex arc.

Reaction to some stimuli is involuntary and unconscious. This type of response is called a reflex.

1. Reflex actions are initiated by an outside stimulus such as a piece of dust in an eye or the smell of food.
2. The stimulus is picked up by receptors and passed from axon to axon, through nerves linking the site to the central nervous system.
3. Input is sent to the brain, but at the same time input is sent back through the nerves to motor nerve endings or effectors.
4. A reaction, such as blinking the eye or secreting saliva, is produced.


Central Neuron
Cell Body
White Matter
Spinal Nerve
Gray Matter
Effector
Motor Neuron
Sensory Neuron
Receptor

OBJECTIVE 7 **Describe the divisions of the autonomic nervous system.**

- **sympathetic** – controls all organs and causes them to react to increased needs

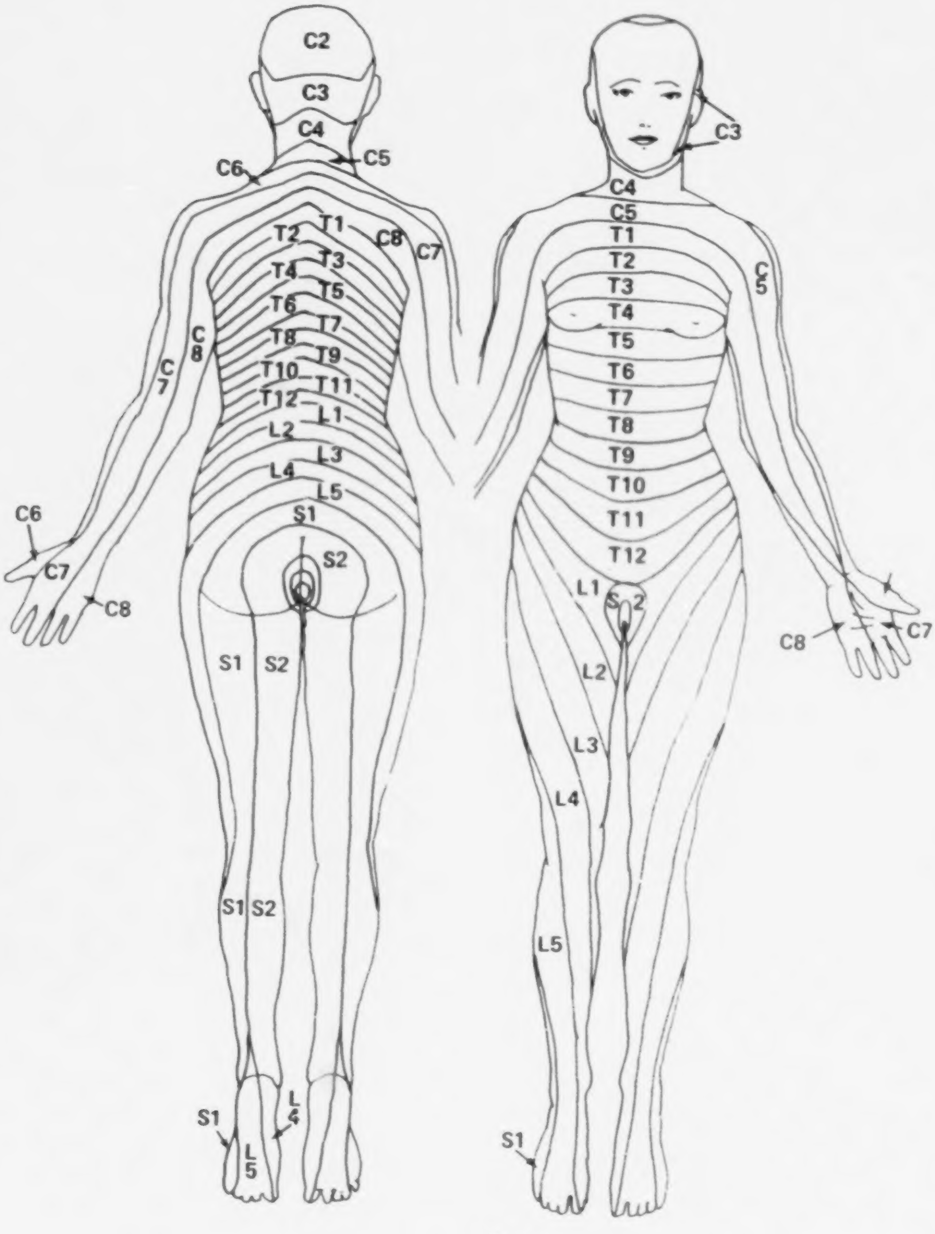
- **parasympathetic** – returns bodily functions to normal when increased needs no longer exist

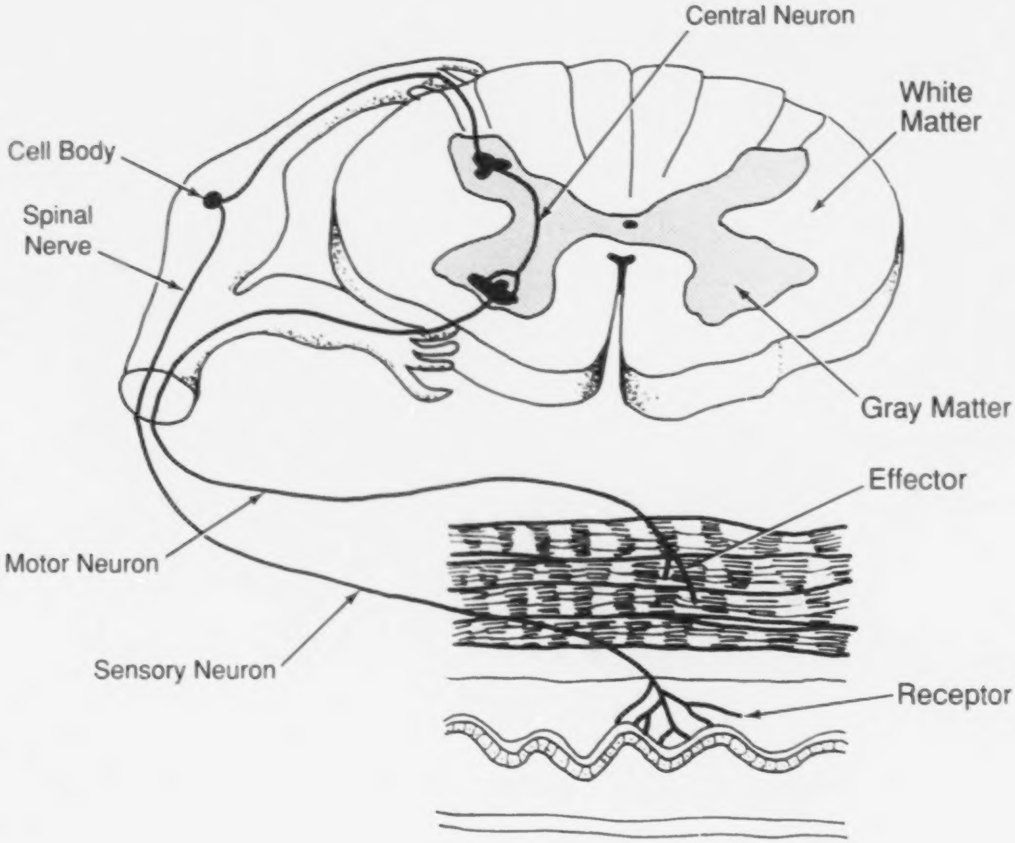
EXAMPLE: When frightened, the sympathetic system prepares us for "light or flight" by increasing heart rate, respiration, adrenalin production, etc. When the fear subsides, the parasympathetic system returns functions to normal.

OBJECTIVE 8 **Match parasympathetic and sympathetic effects to the associated organ and systems.**

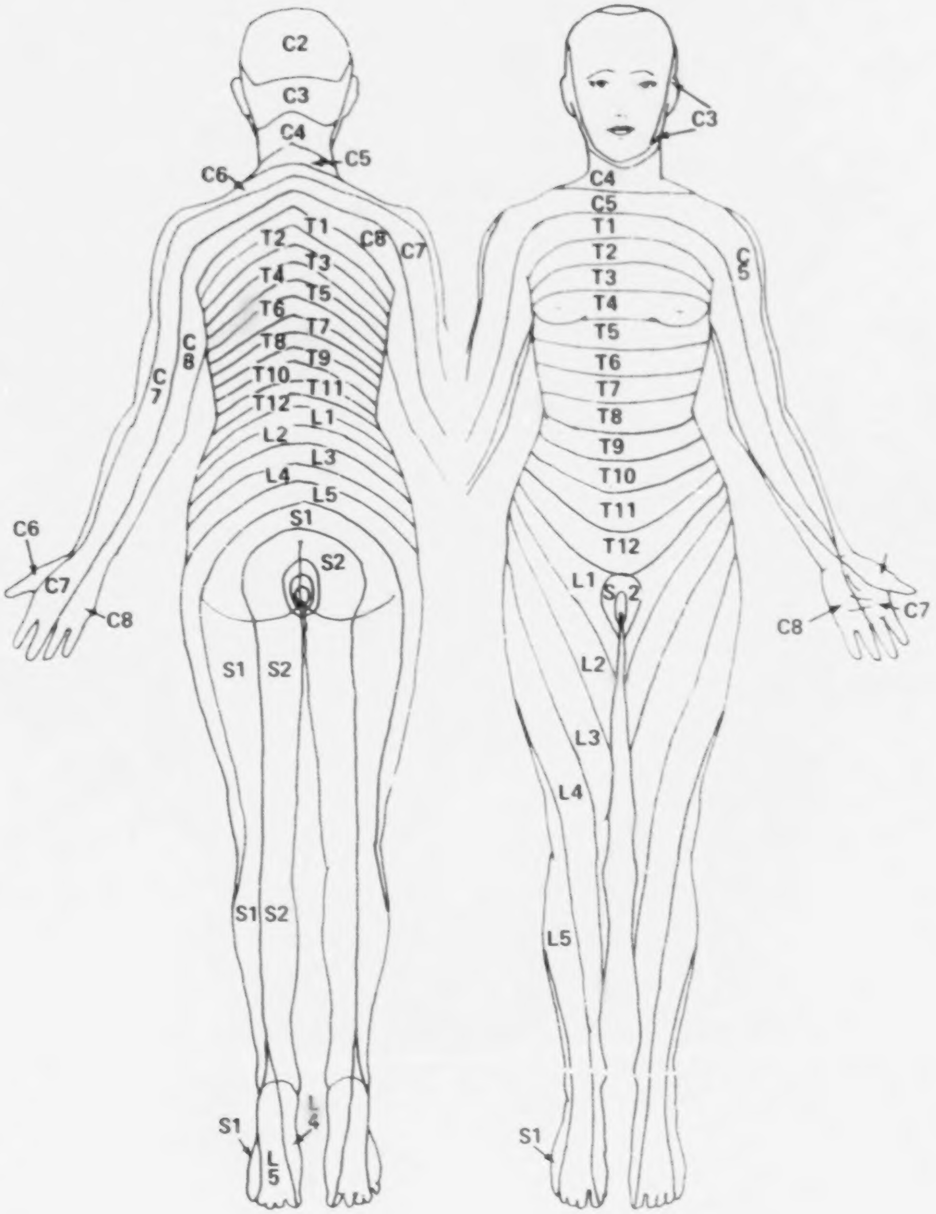
Organ/System	Parasympathetic Effect	Sympathetic Effect
Adipose tissue	No effect	Stimulates free fatty acid release from fat cells
Blood vessels	No effect on most blood vessels	Constricts blood vessels in viscera and skin; dilates vessels in skeletal muscle and heart; increases blood pressure
Lungs and bronchial tubes	Constricts bronchioles	Dilates bronchioles
Heart	Decreases rate and strength of contraction; constricts coronary vessels	Increases rate and strength of contraction; dilates coronary vessels
Digestive system	Stimulates or increases smooth muscle motility and amount of secretion; relaxes sphincters	Decreases or inhibits motility; constricts digestive system sphincters
Liver	Stimulates glycogen production; promotes glycogenesis; increases bile secretion	Stimulates glycogen breakdown; promotes glycogenolysis; decreases bile secretion
Urinary bladder/urethra	Relaxes sphincters (allows voiding); stimulates contraction of muscular wall	Constricts sphincters (prevents voiding); stimulates relaxation of muscular wall
Kidney	No effect	Constricts blood vessels that cause decreased urine output
Glands–salivary, lacrimal	Stimulates secretion (vasodilation); increases production of saliva and tears	Inhibits secretion (vasoconstriction) resulting in dry mouth and dry eyes
Glands–sweat	No effect	Stimulates to produce perspiration
Adrenal medulla	No effect	Stimulates secretion of epinephrine and norepinephrine
Adrenal cortex	No effect	Stimulates secretion of glucocorticoid
Eye–iris	Stimulates constrictor muscles; constricts pupils	Stimulates dilator muscles; dilates pupils
Eye–ciliary muscle	Stimulates to increase bulging of lens to prepare for close vision	Inhibits to decrease bulging of lens to prepare for distant vision
Arrector pili of hair follicles	No effect	Stimulates; produces "goosebumps"
Sex organs, penis, uterus	Vasodilation and erection in both sexes; secretion in female	In female inhibits contraction if not pregnant, stimulates contraction if pregnant; in male vasoconstriction of ductus deferens, seminal vesicle, prostrate results in ejaculation

THE DERMATOMES

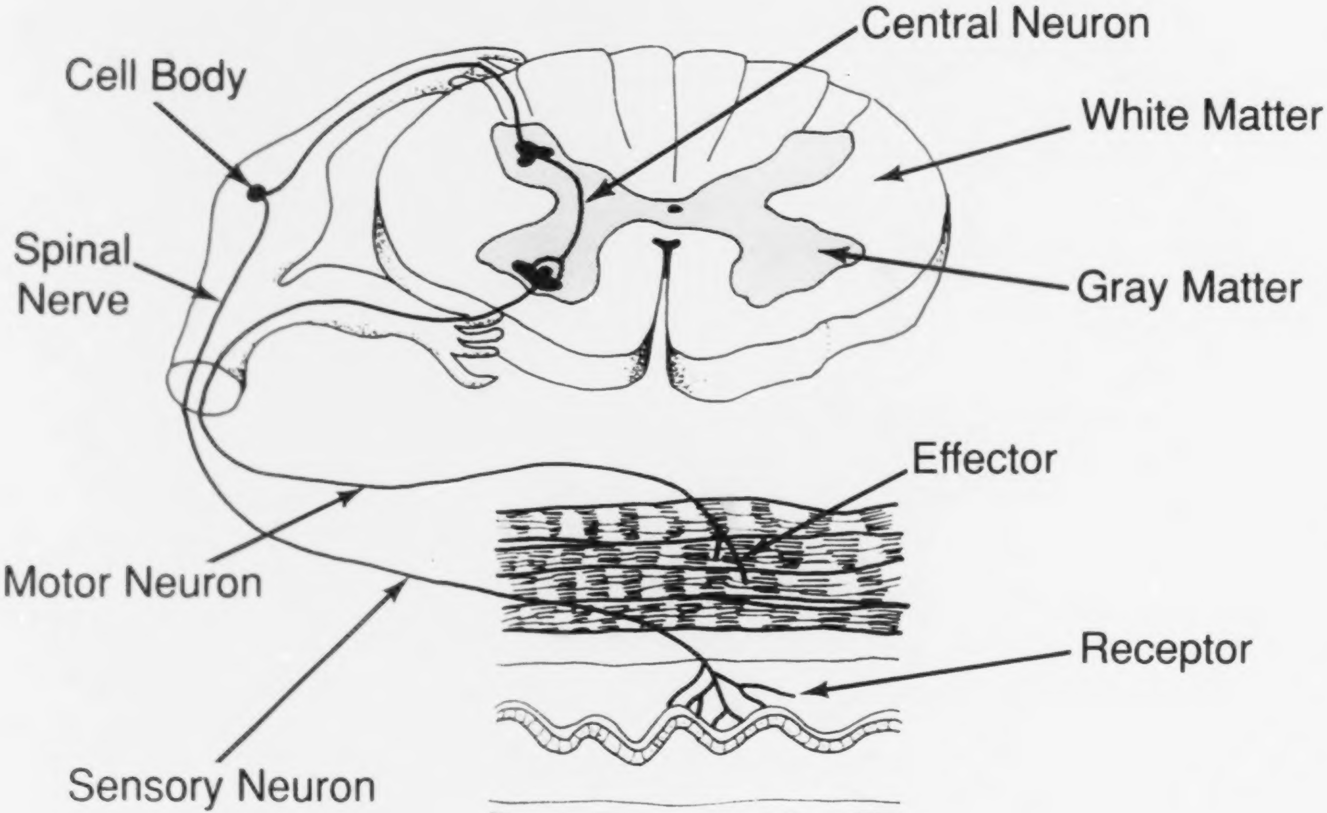

C2
C3
C4
C5
C6
T1
T2
C8
C7
T3
T4
T5
T6
T7
T8
T9
C8
C7
T10
T11
T12
L1
L2
L3
L4
L5
S1
S2
C6
C7
C8
S1
S2
S1
S2
S1
L4
L5
C3
C4
C5
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
C5
L1
S2
L2
L3
L4
L5
C8
C7
S1


Central Neuron
White Matter
Cell Body
Spinal Nerve
Gray Matter
Effector
Motor Neuron
Sensory Neuron
Receptor

The Dermatomes


C2
C3
C4
C5
C6
T1
T2
C8
C7
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
L1
L2
L3
L4
L5
S1
S2
C6
C7
C8
C8
C7
S1
S2
S1
S2
S1
L4
L5
C3
C4
C5
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
C5
L1
S2
C8
C7
L2
L3
L4
L5
S1

Refex Arc


Central Neuron
Cell Body
White Matter
Spinal Nerve
Gray Matter
Effector
Motor Neuron
Receptor
Sensory Neuron

TRANSPARENCY MASTER 2 Body Structure and Function
CIMC XIV 21

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization
  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language
  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing self confidence/esteem

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.
  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:

  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.

  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.

- If students have difficulty adapting their presentation to a specific audience:

  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.

  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.

- If students have difficulty creating a finished product:

  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.

  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

- If students have difficulty developing self confidence/esteem:

  - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.

- Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.

- Allow the students to work in heterogenous groups to enable the less confident students to learn from the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE PERIPHERAL NERVOUS SYSTEM

XIV

Name ______________________________ Score ____________

OBJECTIVE 9

Communicate about how the peripheral nervous system works.

INTRODUCTION

It may seen that there is little we can do to affect the health of the peripheral nervous system. But your nervous system is affected by your diet. Inadequate amounts of key vitamins and minerals will decrease your nervous system's ability to function properly.

DIRECTIONS

Create a poster, pamphlet, or skit discussing the peripheral nervous system and how it works. Present the project to your class.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (written and oral)

Job Acquisition/ Development Skills
- Develop self confidence/ esteem

ASSIGNMENT ANSWERS	THE PERIPHERAL NERVOUS SYSTEM	XIV
ASSIGNMENT SHEET	The project should contain accurate, up-to-date information and meet all HOSA guidelines.	

740

WRITTEN TEST

THE PERIPHERAL NERVOUS SYSTEM

XIV

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with the peripheral nervous system to their definitions. Write the correct letter in the blank.

_____ 1. The short message route taken to process and react to stimuli and produce a reflex action

_____ 2. An automatic response to stimulus

_____ 3. An area of skin supplied by a specific spinal nerve.

_____ 4. Twelve pair of nerves that convey special and general sense impulses and control voluntary muscles, glands, and involuntary muscles

a. cranial nerves

b. dermatome

c. nerve center

d. reflex

e. reflex arc

f. reflex path

OBJECTIVE 2

List parts of the peripheral nervous system.

____

____

____

OBJECTIVE 3

Define afferent and efferent impulses.

Afferent

____

____

____

____

May be photocopied for student use

Efferent

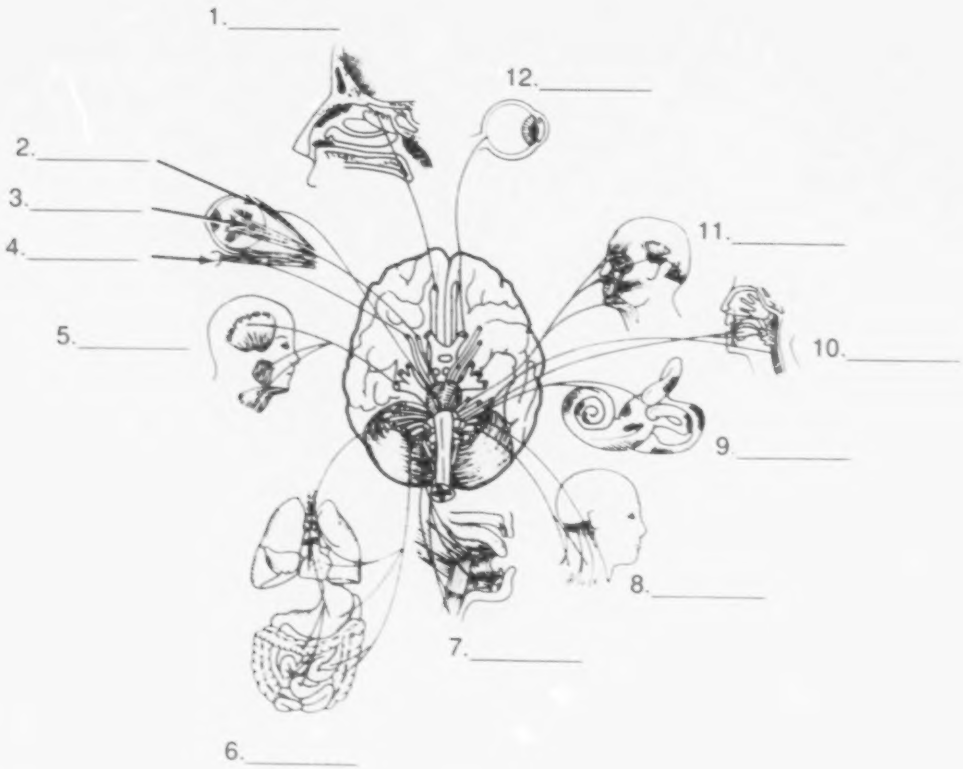
____

____

____

____

OBJECTIVE 4 **Label cranial nerves.**


1.________
12.________
2.________
3.________
4.________
11.________
5.________
10.________
9.________
8.________
7.________
6.________

May be photocopied for student use.

742

OBJECTIVE 5

Match cranial nerves to their functions.

Part I

_____ 1. Controls lateral eye movement

_____ 2. Controls muscles of the neck and upper back

_____ 3. Controls one eyeball muscle

_____ 4. Controls part of the eyeball muscles

_____ 5. Controls tongue muscles

_____ 6. Sense of hearing and balance

a. abducens
b. auditory
c. facial
d. hypoglossal
e. oculomotor
f. spinal accessory
g. trigeminal
h. trochlear
i. vagus

Part II

_____ 1. Sense of sight

_____ 2. Sense of smell

_____ 3. Supplies facial muscles, middle ear, and taste

_____ 4. Swallowing, hunger, speech muscles, breathing, heart rate, peristalsis, and control of glands in the stomach and pancreas

_____ 5. Taste, swallowing

_____ 6. Three branches supply cornea and conjunctive; upper portion of face, ear, lower lip, teeth, and gums; and muscles for chewing

a. auditory
b. facial
c. glossopharyngeal
d. hypoglossal
e. olfactory
f. optic
g. trigeminal
h. trochlear
i. vagus

May be photocopied for student use.

OBJECTIVE 6 **Arrange in order the steps in transmission through the reflex arc.** Write a "1" in the blank before the first step, a "2" in the blank before the second step, etc.

_____ 1. Reflex actions are initiated by an outside stimulus such as a piece of dust in an eye or the smell of food.

_____ 2. A reaction, such as blinking the eye or secreting saliva, is produced.

_____ 3. Input is sent to the brain, but at the same time input is sent back through the nerves to motor nerve endings or effectors.

_____ 4. The stimulus is picked up by receptors and passed from axon to axon, through nerves linking the site to the central nervous system.

OBJECTIVE 7 **Describe the divisions of the autonomic nervous system.**

____

____

____

____

____

____

____

____

____

____

May be photocopied for student use

OBJECTIVE 8 **Match parasympathetic and sympathetic effects to the associated organ and systems.** Write the letter of the organ/system in the correct section of the chart. The organs/systems are listed below.

Organ/System	Parasympathetic Effect	Sympathetic Effect
1.	No effect	Stimulates free fatty acid release from fat cells
2.	No effect on most blood vessels	Constricts blood vessels in viscera and skin; dilates vessels in skeletal muscle and heart; increases blood pressure
3.	Constricts bronchioles	Dilates bronchioles
4.	Decreases rate and strength of contraction; constricts coronary vessels	Increases rate and strength of contraction; dilates coronary vessels
5.	Stimulates or increases smooth muscle motility and amount of secretion; relaxes sphincters	Decreases or inhibits motility; constricts digestive system sphincters
6.	Stimulates glycogen production; promotes glycogenesis; increases bile secretion	Stimulates glycogen breakdown; promotes glycogenolysis; decreases bile secretion
7.	Relaxes sphincters (allows voiding); stimulates contraction of muscular wall	Constricts sphincters (prevents voiding); stimulates relaxation of muscular wall
8.	No effect	Constricts blood vessels that cause decreased urine output
9.	Stimulates secretion (vasodilation); increases production of saliva and tears	Inhibits secretion (vasoconstriction) resulting in dry mouth and dry eyes
10.	No effect	Stimulates to produce perspiration
11.	No effect	Stimulates secretion of epinephrine and norepinephrine
12.	No effect	Stimulates secretion of glucocorticoid
13.	Stimulates constrictor muscles; constricts pupils	Stimulates dilator muscles; dilates pupils
14.	Stimulates to increase bulging of lens to prepare for close vision	Inhibits to decrease bulging of lens to prepare for distant vision
15.	No effect	Stimulates; produces "goosebumps"
16.	Vasodilation and erection in both sexes; secretion in female	In female inhibits contraction if not pregnant, stimulates contraction if pregnant; in male vasoconstriction of ductus deferens, seminal vesicle, prostrate results in ejaculation

May be photocopied for student use.

a. adipose tissue

b. adrenal cortex

c. adrenal medulla

d. arrector pili of hair follicles

e. blood vessels

f. digestive system

g. eye-ciliary muscle

h. eye-iris

i. glands-salivary, lacrimal

j. glands-sweat

k. heart

l. kidney

m. liver

n. lungs and bronchial tubes

o. sex organs, penis, uterus

p. urinary bladder/ urethra

NOTE: Objective 9 is evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

THE PERIPHERAL NERVOUS SYSTEM

XIV

OBJECTIVE 1

1. e
2. d
3. b
4. a

OBJECTIVE 2

- Cranial nerves
- Spinal nerves
- Autonomic nerves (ganglia and fiber)

OBJECTIVE 3

Afferent (also called sensory or receptor impulses) – Impulses sent from all parts of the body to the central nervous system conveying information about the body status or environment

Efferent (also called motor or efferent impulses) – Impulses sent from the central nervous system to all parts of the body conveying "instructions" for a change or reaction

OBJECTIVE 4

1. Olfactory
2. Abducens
3. Oculomotor
4. Trochlear
5. Trigeminal
6. Vagus
7. Hypoglossal
8. Spinal accessory
9. Auditory
10. Glossopharyngeal
11. Facial
12. Optic

OBJECTIVE 5

Part I		Part II	
1.	a	1.	f
2.	f	2.	e
3.	h	3.	b
4.	e	4.	i
5.	d	5.	c
6.	b	6.	g

OBJECTIVE 6

1. 1
2. 4
3. 3
4. 2

OBJECTIVE 7

Discussion should include the following:

- Sympathetic – controls all organs and causes them to react to increased needs
- Parasympathetic – returns bodily functions to normal when increased needs no longer exist

OBJECTIVE 8

1. a
2. e
3. n
4. k
5. f
6. m
7. p
8. l
9. i
10. j
11. c
12. b
13. h
14. g
15. d
16. o

OBJECTIVE SHEET

THE SPECIAL SENSES

XV

INTRODUCTION

The senses allow us to understand and react to changes in our environment, to danger, and to internal signals such as hunger. As children we learned about the five senses; sight, sound, smell, taste, and touch. As health care students today, the importance of the proper function of all senses must be understood.

UNIT OBJECTIVE

After completing this unit, the student will be able to identify the structures and functions of the ears, eyes, nose, and tongue. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the special senses to their definitions.
2. List basic and special senses.
3. Label structures of the eye.
4. Match eye and accessory structures to their functions.
5. Distinguish between the functions of the extrinsic and intrinsic muscles of the eye.
6. Arrange in order the steps in light refraction.
7. Label structures of the ear.
8. Arrange in order the steps in hearing.
9. Label areas of taste.
10. Choose the word or phrase that completes statements about the reactions of taste buds.
11. Select from a list true statements about the sense of smell.
12. Communicate about how the special senses work. (Assignment Sheet)

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Order materials to supplement unit. Models such as *Eye, Eye in Orbit, and Ear Models* may be ordered from Health Edco, P.O. Box 21207, Waco, TX 76702-1207, 1-800-299-3366.
- Invite an ophthalmologist, ENT, or optician to discuss special senses.

  NOTE: Supply guest speakers with the Objective Sheet, Information Sheet and any other components you want them to cover. Please confirm the engagement 2-3 days before they are to speak.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.
  - Assist students in scheduling and presenting prepared and extemporaneous speeches.

- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the special senses to their definitions.

- Review prefix and suffix usage.

Objective 2: List basic and special senses

- Distinguish between basic and special senses.
- Have students discuss the importance of all senses for survival.
- Have students discuss why touch is a basic, rather than special, sense.

Objective 3: Label structures of the eye.

Objective 4: Match eye and accessory structures to their functions.

- Review structure names and functions.
- Compare the operation of an eye to the operation of a telescope or microscope.
- Provide students with a variety of photographs and drawings of eyes.
- Invite an ophthalmologist or optician to explain the function of glasses or contact lenses.

751

Objective 5: Distinguish between the functions of the extrinsic and intrinsic muscles of the eye.

Objective 6: Arrange in order the steps in light refraction.

- Compare and contrast the actions made by having students manipulate a camera. Aiming and pointing would parallel the extrinsic muscles, while focusing the camera would parallel the intrinsic muscles. A video camera could be used for the same purpose.

- Have students try to control the extrinsic and intrinsic muscles and classify them as voluntary or involuntary. Have students discuss why they are voluntary or involuntary.

- Lead students through eye exercises, such as rolling eyes, to make them aware of the muscles.

Objective 7: Label structures of the ear.

Objective 8: Arrange in order the steps in hearing.

- Review ear structures and their functions.

- Use common and medical names, but explain to students that they will be responsible for knowing and using medical terms.

- Invite a speech and hearing pathologist to discuss impairments to hearing and the role of hearing in other senses, especially speech.

Objective 9: Label areas of taste.

Objective 10: Choose the word or phrase that completes statements about the reactions of taste buds.

- Allow students to look at a tongue under a microscope.

- Allow students to inspect a beef tongue and identify structures.

- Use taste-tests to relate taste to other senses. For example, have blindfolded students taste white and dark chocolate and choose the "most chocolate" tasting. Repeat the experiment without the blindfold and compare results.

Objective 11: Select from a list true statements about the sense of smell.

- Explain to students that the sense of smell is not well understood, but may play an important role in society.

- Discuss pheromone research.

- Have students list smells that cause immediate, strong reactions. Some items might be bacon or coffee in the morning, vomit, freshly mowed lawns, and sour milk.

APPLICATION

Objective 12: Communicate about how the special senses work.

- Have students complete the assignment sheet t meet HOSA guidelines.

EVALUATION

Written Test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED

Electronic Media

- The following materials are available from Opportunities for Learning, Inc., 941 Hickory Lane, Dept XN, P.O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

  Anatomy and Physiology Filmstrips, Unit 6, Special Senses. Filmstrip, cassette, and instructor's guide.

  Human System, Filmstrip Sets, Sensory System in the Human Body. Filmstrip with cassette, student self-instruction booklet.
- *Diseases of the Eye, Ear, Nose, and Throat,* Health Edco, P.O. Box 21207, Waco, TX 76702-1207, 1-800-299-3366. Available in slides or filmstrips. Covers glaucoma, eye injuries, swimmer's ear, sinusitis, nasal polyps, and adenoid problems.

Print Media

- *Eye Test Chart*, Opportunities for Learning, Inc., 941 Hickory Lane, Dept XN, P.O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

UNIT REFERENCES

- Crider, Andrew B., et al., *Psychology*, Scott, Foresman and Company, Glenview, IL, 1986.

- Duncan, Betty, *Allied Health Careers*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma, 1987.

- Rogers, Helen V., *Practical Nursing 1*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma, 1987.

INFORMATION SHEET

THE SPECIAL SENSES

XV

OBJECTIVE 1

Match terms associated with the special senses to their definitions.

- **accommodation** — adjustment by the lens to make a sharp, clear image on the retina
- **auditory** — pertaining to the sense of hearing
- **cerumen** — wax-like, soft, brown secretion found in the external ear canal; lubricates and protects external canal and tympanum/tympanic membrane
- **equilibrium** — normal orientation of the body in respect to its environment
- **extrinsic** — outside a part
- **incus** — anvil-shaped bone of the middle ear
- **intrinsic** — within a part
- **malleus** — hammer-shaped bone of the middle ear
- **olfactory** — pertaining to the sense of smell
- **ophthalmology** — the study of the eye and its diseases
- **ophthalmologist** — a medical doctor who specializes in the eye and its diseases
- **optician** — one who makes lenses and fits glasses
- **optometrist** — a person trained and licensed to examine the eyes for vision problems and to prescribe and adapt lenses
- **orbit** — the cavity in the bone in which the eye is located
- **otology** — the study of the ear and its diseases
- **refraction** — the bending of light rays, as when light goes through a prism
- **sense** — general faculty through which conditions outside or inside the body are perceived
- **stapes** — stirrup-shaped bone of the middle ear
- **taste buds** — receptors of taste found in the tongue

OBJECTIVE 2

List basic and special senses.

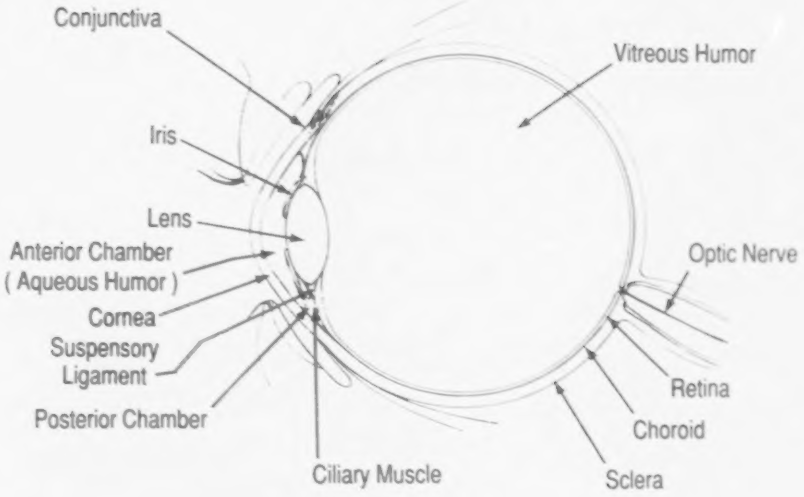
Basic senses

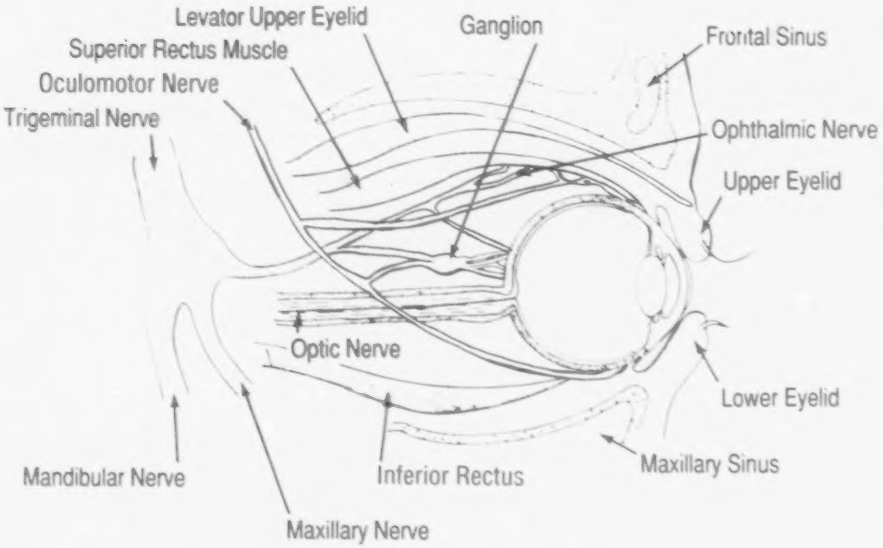
- Hunger and thirst
- Touch, pressure, temperature, and pain
- Position and balance

Special senses

- Vision
- Hearing
- Taste
- Smell

OBJECTIVE 3 | Label structures of the eye and accessories.


Conjunctiva
Vitreous Humor
Iris
Lens
Anterior Chamber
(Aqueous Humor)
Optic Nerve
Cornea
Suspensory
Ligament
Retina
Posterior Chamber
Choroid
Ciliary Muscle
Sclera


Levator Upper Eyelid
Ganglion
Superior Rectus Muscle
Frontal Sinus
Oculomotor Nerve
Trigeminal Nerve
Ophthalmic Nerve
Upper Eyelid
Optic Nerve
Lower Eyelid
Maxillary Sinus
Mandibular Nerve
Inferior Rectus
Maxillary Nerve

OBJECTIVE 4

Match eye and accessory structures to their functions.

- **anterior chamber** — space in front of lens between cornea and iris filled with aqueous humor
- **choroid** — middle vascular layer on lateral and posterior eyeball, supplies oxygen and nutrients
- **ciliary muscle** — controls shape of lens to make sharp, clear image
- **conjunctiva** — covers the front of the eyeball; lines the eyelid; aids in keeping the eye moist
- **cornea** — clear, transparent part of the sclera on the front of the eyeball; allows light through
- **eyelid muscles** — levators which open and close eyelids
- **iris** — circular muscle; regulates amount of light entering pupil; the pigmented or colored part of the eye
- **lacrimal ducts** — located in upper and lower eyelids at inner edge; carry tears from eye to nasal cavity
- **lacrimal gland** — lies superior and lateral to eyeball; secretes tears which moisten and cleanse eye and destroy some bacteria

  NOTE: See Supplement 1.

- **lens** — circular, jelly-like suspension; focuses images on the retina
- **oculomotor nerve** — controls part of eye muscles
- **ophthalmic nerve** — carries impulses of pain, touch, and temperature from eye and surrounding parts
- **optic nerve** — carries visual impulses from retina to brain
- **posterior chamber** — space between iris and lens
- **retina** — inner layer of nerve tissue partially made up of rods and cones, special light-sensitive cells; receives visual images
- **rods and cones** — the light-sensitive receptor cells at the back of the eyeball
- **sclera** — outer white layer of firm, connective tissue covering the eyeball

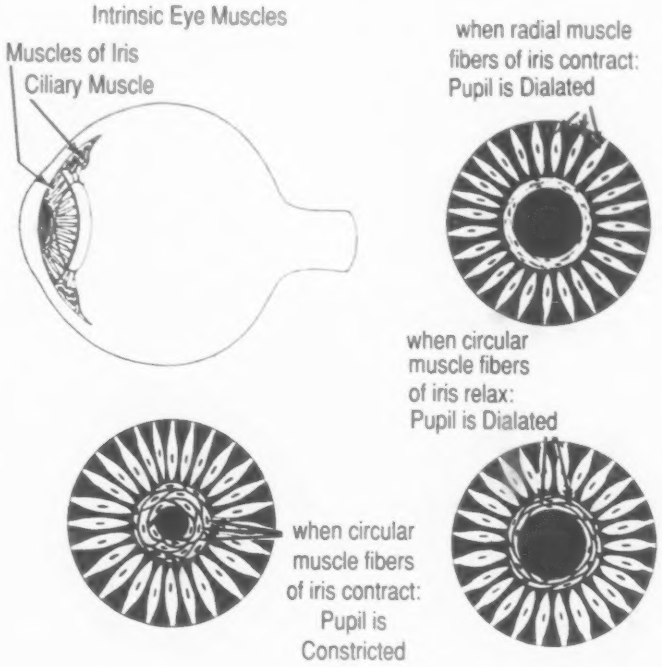
- **suspensory or ciliary ligament** — holds lens in place
- **vitreous humor** — jelly-like substance filling the eyeball posterior to the lens; maintains shape of eyeball

OBJECTIVE 5

Distinguish between the functions of the extrinsic and intrinsic muscles of the eye.

Intrinsic muscles

- Adjust the shape of the iris to focus on near or far-away objects
- Adjust the pupil to allow more or less light into the eye


Intrinsic Eye Muscles
Muscles of Iris
Ciliary Muscle
when radial muscle fibers of iris contract: Pupil is Dialated
when circular muscle fibers of iris relax: Pupil is Dialated
when circular muscle fibers of iris contract: Pupil is Constricted

Extrinsic muscles

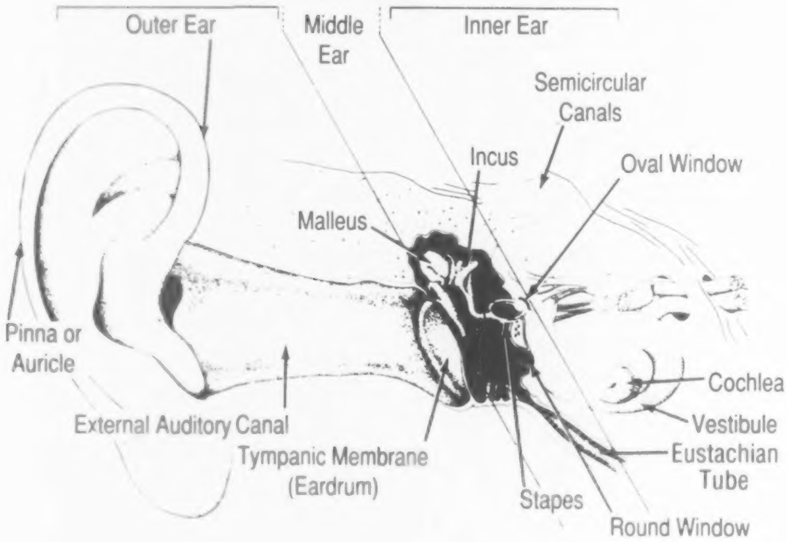
- Move the eyeball
- Allow the eye to follow an object

OBJECTIVE 6 **Arrange in order the steps in light refraction.**

1. Light enters the eye through the cornea and travels through the pupil.
2. The pupil adjusts to regulate the amount of light entering the eye.
3. The lens bends the light, making it fall on the retina.
4. Nerve cells in the retina, called rods and cones, secrete chemicals.
5. Through these chemicals, the nerve impulse is transmitted across the synapse from rods and cones to optic nerve.
6. The impulse travels through the optic nerve to the brain.

OBJECTIVE 7 | **Label structures of the ear.**

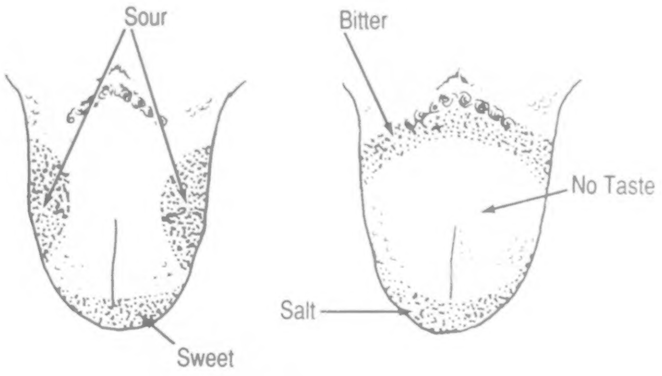
The Ear


Outer Ear
Middle Ear
Inner Ear
Semicircular Canals
Incus
Oval Window
Malleus
Pinna or Auricle
Cochlea
Vestibule
External Auditory Canal
Eustachian Tube
Tympanic Membrane (Eardrum)
Stapes
Round Window

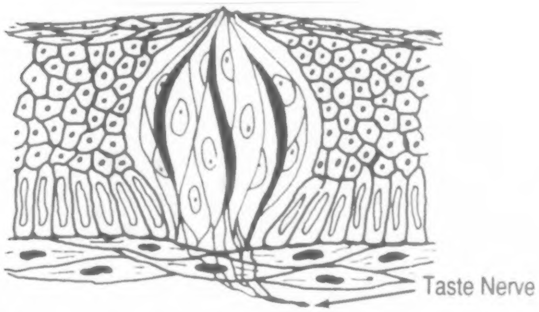
OBJECTIVE 8 **Arrange in order the steps in hearing.**

1. The pinna catches sound waves and directs them into the external auditory canal.
2. Sound waves make the tympanic membrane vibrate.
3. The tympanic membrane is connected to the ossicles, the three small bones in the middle ear. The malleus strikes the incus, which transfers the vibration to the stapes, then to a small membrane called the oval window.
4. Vibrations are passed through the oval window into the cochlea.
5. Fluid filling the cochlea causes tiny hairs on the basilar membrane to vibrate.
6. Vibrations of the hairs are transferred to nerve impulses and transmitted to the brain.

OBJECTIVE 9 **Labels areas of taste.**



Location on the Tongue of the Four Basic Taste Sensations



Taste Buds Are Special cells on the Tongue containing Nerve Endings Sensitive to Taste

Different kinds of taste buds have separate locations on the tongue.

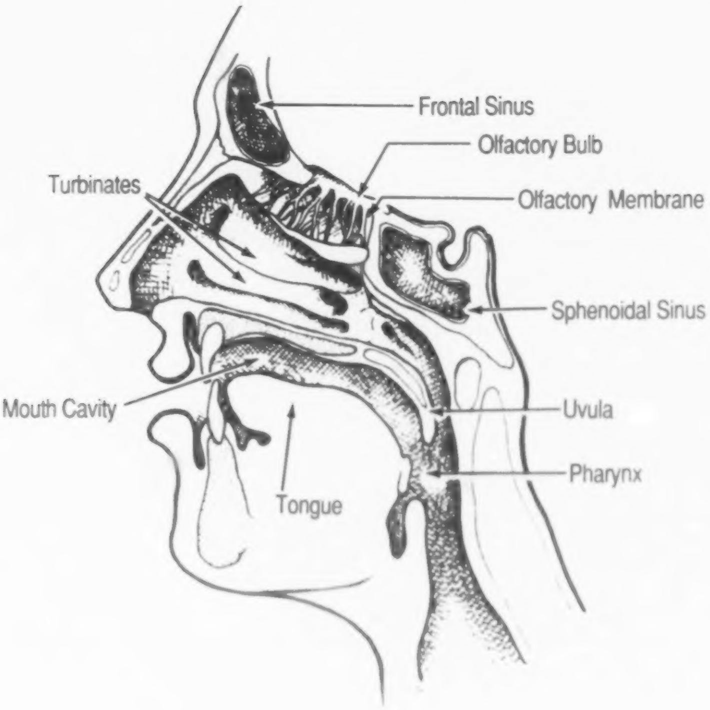
- Sugar, or sweet, taste is located near the tip of the tongue.
- Sour taste is located at the sides of the tongue.
- Salty taste is located near the tip of the tongue.
- Bitter taste is located at the back of the tongue.
- The middle of the tongue contains no taste buds.

OBJECTIVE 10

Choose the word or phrase that completes statements about the reactions of taste buds.

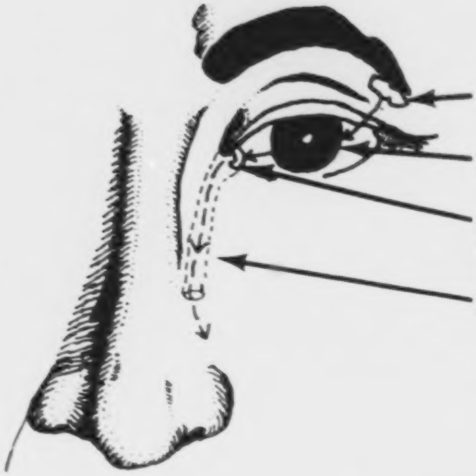
- The tongue is covered with bumps, called papillae.
- Taste buds are located in the walls of the valleys between papillae.
- Each taste bud contains receptor cells that react to items that are put in the mouth.
- Taste buds relay impulses to two different nerves which carry the impulses to the brain

OBJECTIVE 11 | **Select from a list true statements about the sense of smell.**


Frontal Sinus
Olfactory Bulb
Turbinates
Olfactory Membrane
Sphenoidal Sinus
Mouth Cavity
Uvula
Pharynx
Tongue

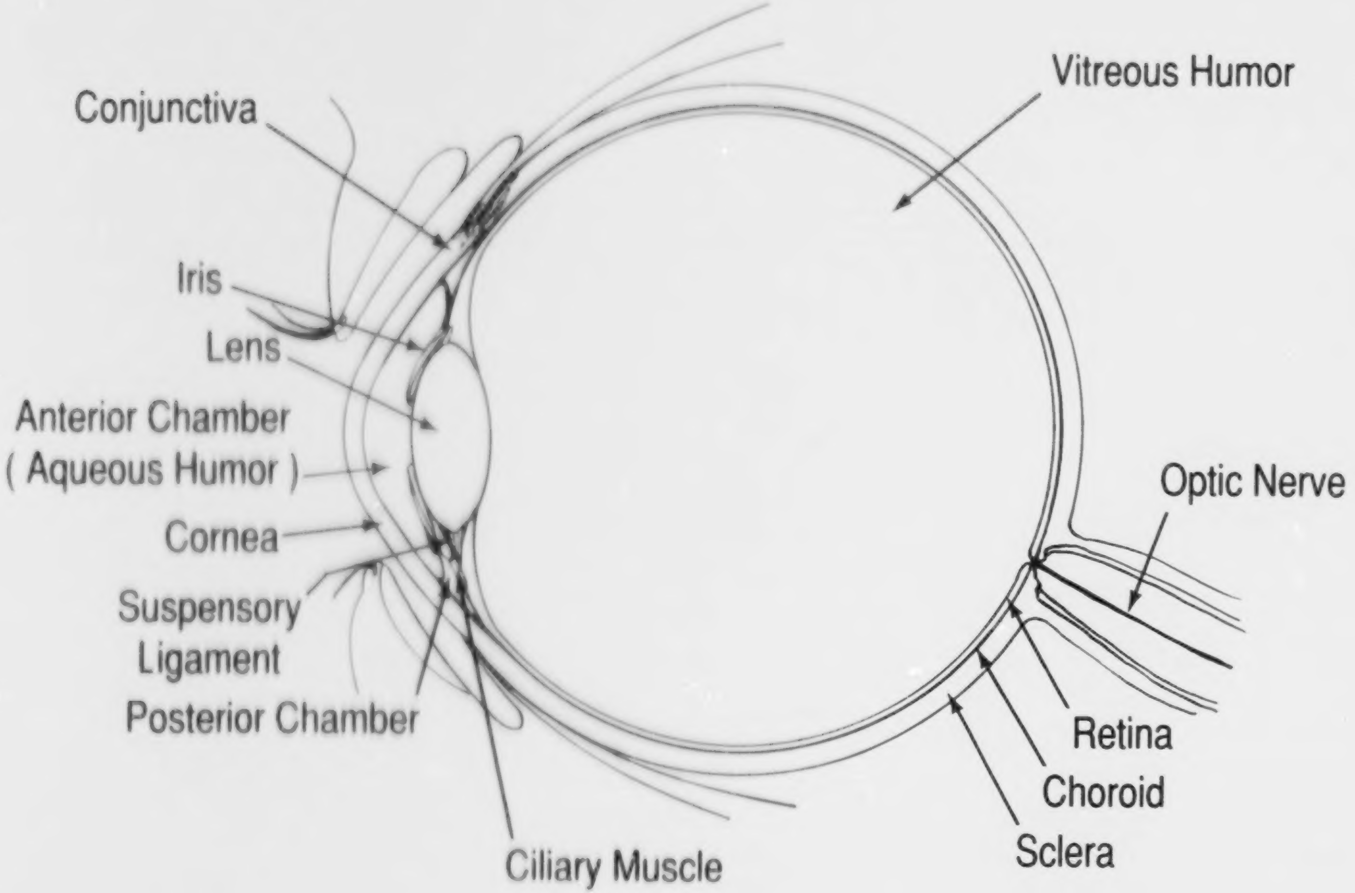
- Sense of smell is closely related to the sense of taste.
- Receptors are located in the olfactory epithelium in the upper part of the nasal cavity.
- Olfactory nerve carries smell impulses to the brain.
- Olfactory nerves tire quickly and become less sensitive after detecting the same odor for a period of time.

LACRIMAL GLAND



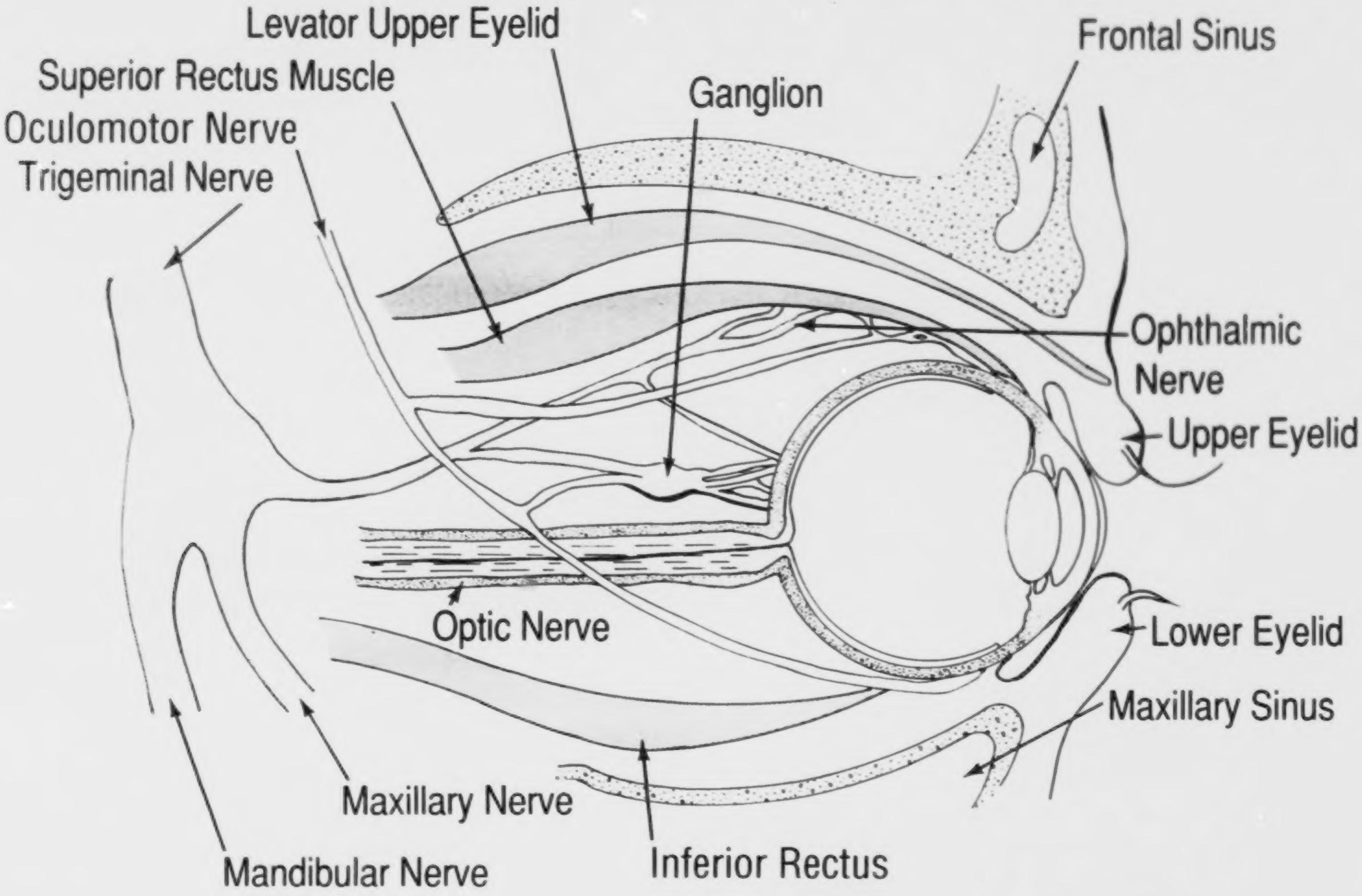
1. Lacrimal Gland Releases Tears
2. Tears Wash Over Eyeball
3. Tears Leave eye Via Lacrimal duct
4. Tears Wash Down Into Nasolacrimal Duct

The Eye


Conjunctiva
Iris
Lens
Anterior Chamber
(Aqueous Humor)
Cornea
Suspensory Ligament
Posterior Chamber
Ciliary Muscle
Vitreous Humor
Optic Nerve
Retina
Choroid
Sclera

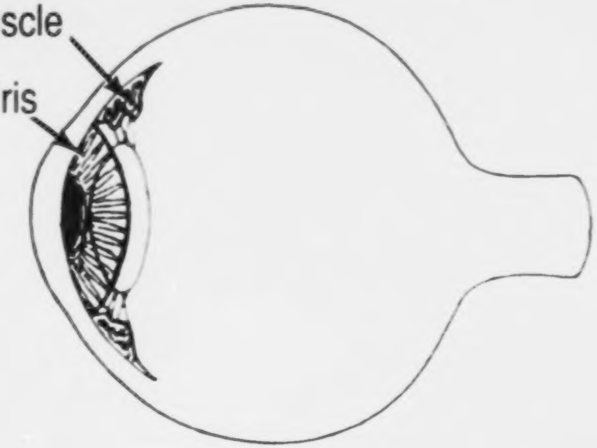
TRANSPARENCY MASTER 1 Body Structure and Function
CIMC - XV - 21

The Eye and Accessory Structures


Levator Upper Eyelid
Superior Rectus Muscle
Oculomotor Nerve
Trigeminal Nerve
Ganglion
Frontal Sinus
Ophthalmic Nerve
Upper Eyelid
Optic Nerve
Lower Eyelid
Maxillary Sinus
Maxillary Nerve
Mandibular Nerve
Inferior Rectus

TRANSPARENCY MASTER 2 - Body Structure and Function
CIMC - XV - 23

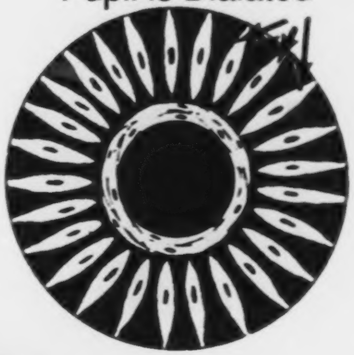
Intrinsic Muscles of the Eyeball



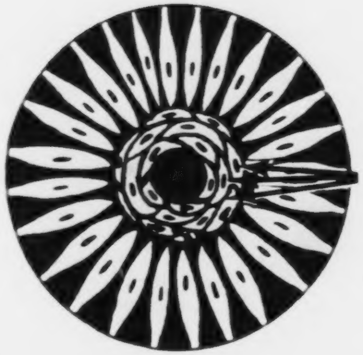
Intrinsic Eye Muscles

Ciliary Muscle

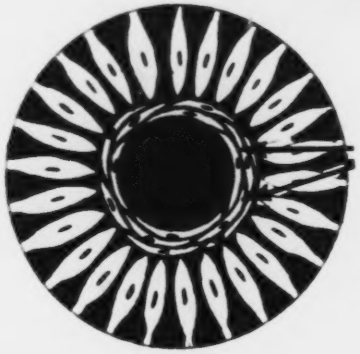
Muscles of Iris



when radial muscle fibers of iris contract: Pupil is Dialated



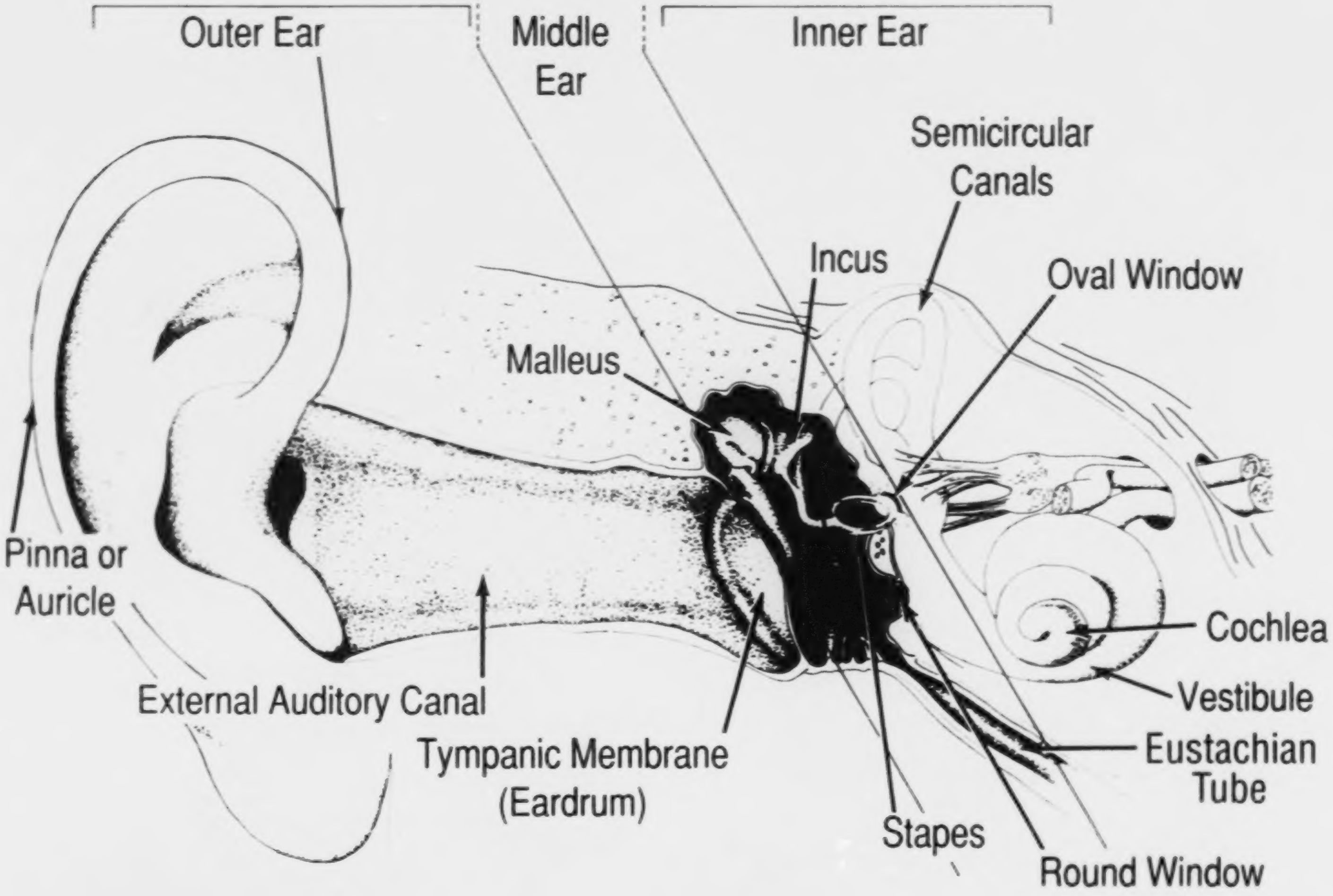
when circular muscle fibers of iris contract: Pupil is Constricted



when circular muscle fibers of iris relax: Pupil is Dialated

TRANSPARENCY MASTER 3 Body Structure and Function
CIMC XV 25

The Ear


Outer Ear
Middle Ear
Inner Ear
Semicircular Canals
Incus
Oval Window
Malleus
Pinna or Auricle
Cochlea
External Auditory Canal
Vestibule
Tympanic Membrane (Eardrum)
Eustachian Tube
Stapes
Round Window

TRANSPARENCY MASTER 4 Body Structure and Function
CIMC XV - 27

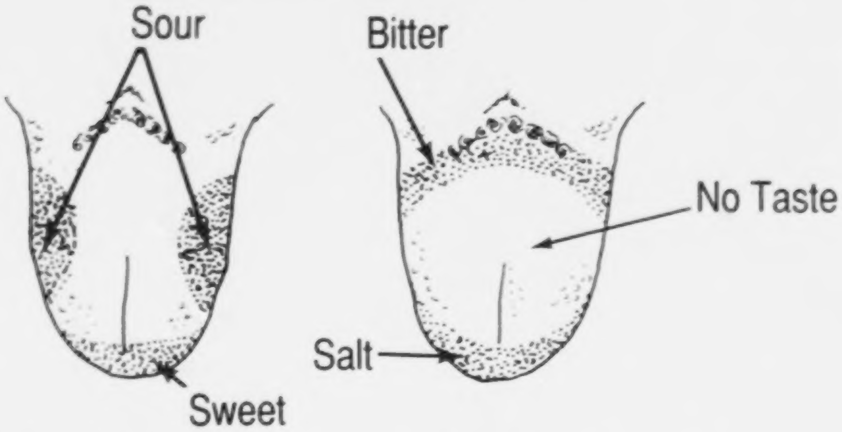
772

773

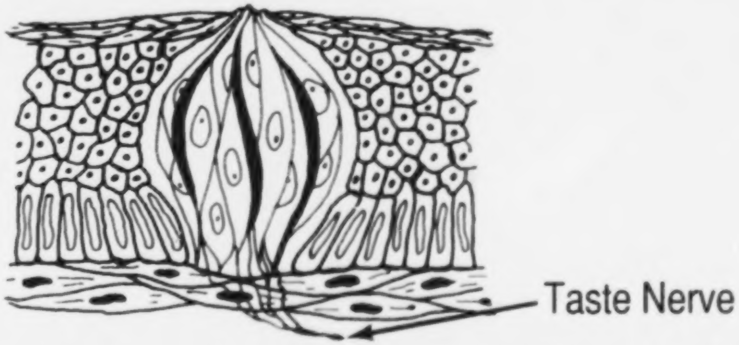
TM 4

TRANSPARENCY MASTER 5 Body Structure and Function
CMC · XV · 29

The Tongue and Taste


Sour
Bitter
No Taste
Salt
Sweet

Location on the Tongue of the Four Basic Taste Sensations

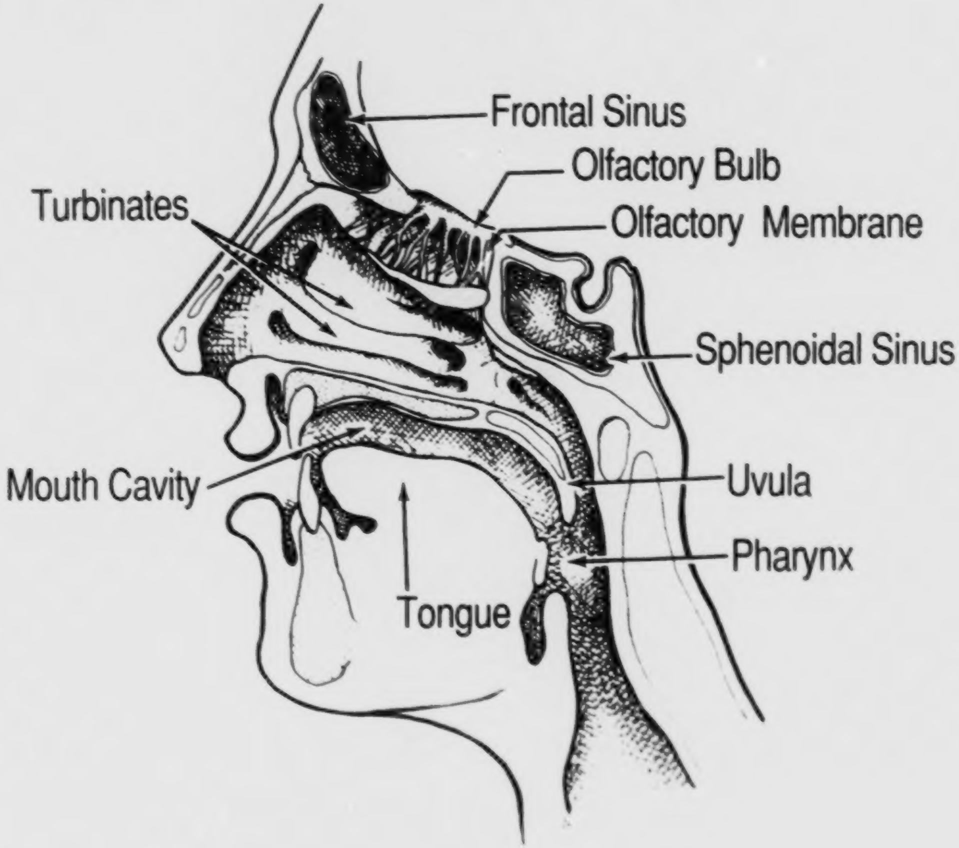

Taste Nerve

Taste Buds Are Special cells on the Tongue containing Nerve Endings Sensitive to Taste

774

775

The Nose and Sense of Smell


Frontal Sinus
Olfactory Bulb
Olfactory Membrane
Turbinates
Sphenoidal Sinus
Mouth Cavity
Uvula
Pharynx
Tongue

ACTIVITY SHEET

Development of:
READING SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

READING SKILLS

- Interpret graphics and symbols

CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Analyze/synthesize information
- Create a finished product

- If students have difficulty interpreting graphics and symbols:
  - Remind them that interpreting a graphic is very similar to reading a page. Each part of the graphic or symbol has a meaning within the art.
  - Suggest that, when they have a graphic, chart, diagram, or table to interpret, they should carefully study the art and compare it to any similar pieces encountered. Also study the key or any other information that will help you understand the meaning of the graphic.
- If students have difficulty analyzing/synthesizing information:
  - Explain that it is usually necessary to learn about complex items or things by examining their make-up or parts, such as studying body structure by examining each individual system or studying auto mechanics by examining the different automobile systems.
  - Also explain that it is sometimes necessary to then study the whole item or thing by studying how the parts work together to make the whole item work. This examination helps us identify and compare the relationships the parts have with each other.

- Help the students understand the concepts by asking what they would do if they turned on a light and nothing happened. Lead them to discuss that they would probably first check to see if the light was plugged in or if the bulb was burned out. Plugging it in or replacing the light bulb might make the light come back on.

- Then ask the students what they would do if the light still didn't work. Lead them to the conclusion that they should check to see if all the electricity was off. If it is, they will have to think about what they know about the whole electrical system–what are its parts. Identifying the parts of the whole will help them recognize the problem.

- If students have difficulty creating a finished product:
    - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
    - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

DIRECTIONS

Trace a sound wave or vision.

Prepare a poster or model of an eye or ear. Indicate how sound or sight is transmitted and registered. Mark the path and label all structures.

Functional Reading Skills

- Interpret graphics & symbols (charts, diagrams, graphs, signs, etc.)

Cognitive Activities Skills

- Analyze/synthesize information
- Create a finished product (written)

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization

  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language

  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing self confidence/esteem

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

- As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

- Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

- Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

- Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:
  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.
  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.
- If students have difficulty adapting their presentation to a specific audience:
  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.
  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.
- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.

- If students have difficulty developing self confidence/esteem:
    - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.
    - Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.
    - Allow the students to work in heterogenous groups to enable the less confident students to learn from the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE SPECIAL SENSES

XV

Name ______________________ Score __________

OBJECTIVE 12

Communicate about how the special senses work.

INTRODUCTION

Sight, smell, sound, touch, and taste are as necessary for sustaining life as other systems. These senses let us know when we are in danger or stimulate the desire to eat. Research into our senses indicates that we may choose our mates because of their scents or be able to reduce pain by touch.

DIRECTIONS

Create a poster, pamphlet, brochure, or oral report about the importance of and care for one of the special senses. Present it to the class.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product

Job Acquisition/ Development Skills
- Develop self confidence/esteem

ASSIGNMENT SHEET

Project should meet all HOSA guidelines, contain current and correct information, and should provide useful information.

786

WRITTEN TEST

THE SPECIAL SENSES

XV

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with the special senses to their definitions.

Part I

_____ 1. Normal orientation of the body in respect to its environment

_____ 2. Pertaining to the sense of hearing

_____ 3. Hammer-shaped bone of the middle ear

_____ 4. Stirrup-shaped bone of the middle ear

_____ 5. The study of the eye and its diseases

_____ 6. The study of the ear and its diseases

_____ 7. Anvil-shaped bone of the middle ear

_____ 8. A person trained and licensed to examine the eyes for vision problems and to prescribe and adapt lenses

_____ 9. The bending of light rays, as when light goes through a prism or water

_____ 10. A medical doctor who specializes in the eye and its diseases

a. auditory
b. equilibrium
c. extrinsic
d. incus
e. intrinsic
f. malleus
g. ophthalmology
h. ophthalmologist
i. optometrist
j. orbit
k. otology
l. refraction
m. sense
n. stapes
o. taste buds

May be photocopied for student use.

Part II

_____ 1. Adjustment by the lens to make a sharp, clear image on the retina

_____ 2. General facility through which conditions outside or inside the body are perceived

_____ 3. Wax-like, soft, brown secretion found in the external ear canal; lubricates and protects external canal and tympanum/tympanic membrane

_____ 4. Receptors of taste found in the tongue

_____ 5. Within a part

_____ 6. Outside a part

_____ 7. One who makes lenses and fits glasses

_____ 8. The cavity in the bone in which the eye is located

_____ 9. Pertaining to the sense of smell

a. accommodation
b. cerumen
c. equilibrium
d. extrinsic
e. incus
f. intrinsic
g. malleus
h. olfactory
i. optician
j. orbit
k. refraction
l. sense
m. taste buds

OBJECTIVE 2 **List basic and special senses**

Basic senses

____

____

____

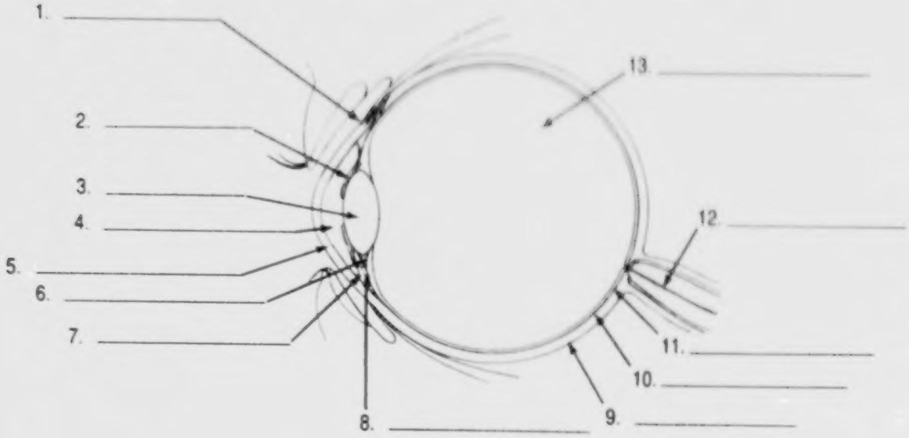
May be photocopied for student use

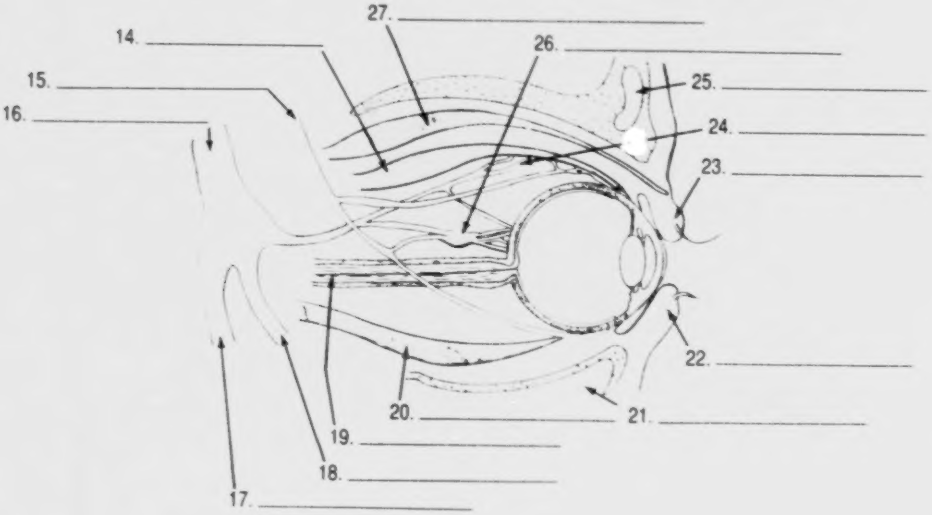
Special senses

May be photocopied for student use.

789

OBJECTIVE 3 | **Label structures of the eye.** Write the name in the blank.


1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.


14.
15.
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.
26.
27.

May be photocopied for student use

OBJECTIVE 4

Match eye and accessory structures to their functions. Write the correct letter in the blank.

Part I

_____ 1. Controls shape of lens to make sharp, clear image

_____ 2. Circular muscle; regulates amount of light entering pupil; the pigmented or colored part of the eye

_____ 3. Carries visual impulses from retina to brain

_____ 4. Clear, transparent part of the sclera on the front of the eyeball; allows light through

_____ 5. Space in front of lens between cornea and iris filled with aqueous humor

_____ 6. Controls part of eye muscles

_____ 7. Inner layer of nerve tissue partially made up of rods and cones, special light-sensitive cells; receives visual images

_____ 8. Holds lens in place

_____ 9. Lies superior and lateral to eyeball; secretes tears which moisten and cleanse eye and destroy some bacteria

_____ 10. Circular, jelly-like suspension; focuses images on the retina

a. anterior chamber

b. choroid

c. ciliary muscle

d. cornea

e. iris

f. lacrimal ducts

g. lacrimal gland

h. lens

i. oculomotor nerve

j. ophthalmic nerve

k. optic nerve

l. posterior chamber

m. retina

n. rods and cones

o. suspensory or ciliary muscle

May be photocopied for student use

Part II

_____ 1. Middle vascular layer on lateral and posterior eyeball, supplies oxygen and nutrients

_____ 2. The light-sensitive receptor cells at the back of the eyeball

_____ 3. Levators which open and close eyelids

_____ 4. Jellylike substance filling the eyeball posterior to the lens; maintains shape of eyeball

_____ 5. Space between iris and lens

_____ 6. Covers the front of the eyeball; lines the eyelid; aids in keeping the eye moist

_____ 7. Located in the upper and lower eyelids at the inner edge; carry tears from eye to nasal cavity

_____ 8. Carries impulses of pain, touch, and temperature from eye and surrounding parts

_____ 9. Outer white layer of firm, connective tissue covering the eyeball

a. anterior chamber
b. choroid
c. conjunctiva
d. eyelid muscles
e. iris
f. lacrimal ducts
g. lacrimal glands
h. lens
i. ophthalmic nerve
j. posterior chamber
k. rods and cones
l. sclera
m. vitreous humor

May be photocopied for student use.

OBJECTIVE 5

Distinguish between the functions of the extrinsic and intrinsic muscles of the eye. Writ an "I" in the blanks before function of intrinsic muscles and an "E" in the blanks before functions of extrinsic muscles.

_____ 1. Move the eyeball

_____ 2. Adjust the pupil to allow more or less light into the eye

_____ 3. Adjust the shape of the iris to focus on near or far-away objects

_____ 4. Allows the eye to follow an object

OBJECTIVE 6

Arrange in order the steps in light refraction. Write a "1" in the blank before the first step, a "2" in the blank before the second step, etc.

_____ 1. The pupil adjusts to regulate the amount of light entering the eye.

_____ 2. Nerve cells in the retina, called rods and cones, secrete chemicals.

_____ 3. Light enters the eye through the cornea and travels through the pupil.

_____ 4. The impulse travels through the optic nerve to the brain.

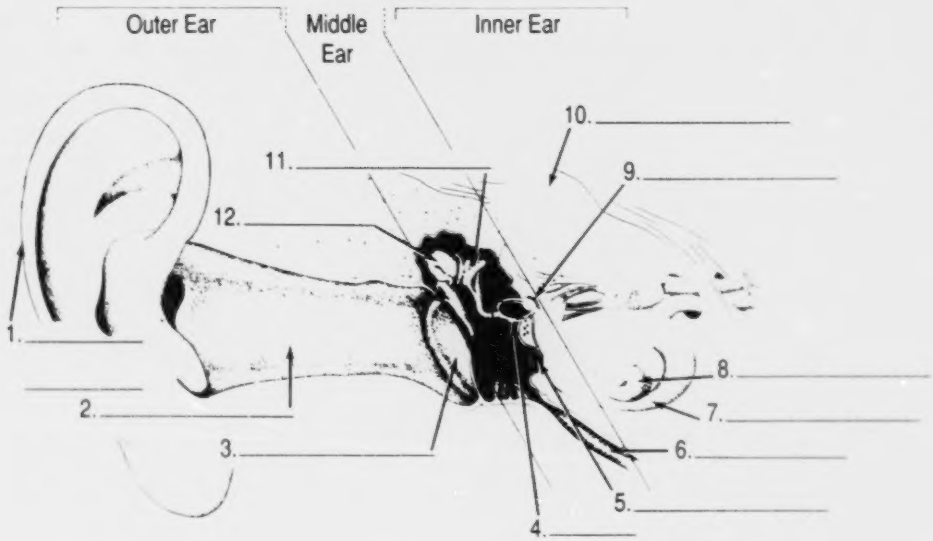
_____ 5. The lens bends the light, making it fall on the retina.

_____ 6. Through these chemicals, the nerve impulse is transmitted across the synapse from rods and cones to optic nerve.

May be photocopied for student use.

OBJECTIVE 7 | **Label structures of the ear.** Write the name in the blank.

The Ear



Outer Ear
Middle Ear
Inner Ear
10. ____________
11. ____________
9. ____________
12. ____________
1. ____________
____
8. ____________
7. ____________
2. ____________
3. ____________
6. ____________
5. ____________
4. ________

794

OBJECTIVE 8

Arrange in order the steps in hearing. Write a "1" in the blank before the first statement, a "2" in the blank before the second, etc.

_____ 1. The tympanic membrane is connected to the ossicles, the three small bones in the middle ear. the malleus strikes the incus, which transfers the vibration to the stapes, then to a small membrane called the oval window.

_____ 2. Vibrations of the hairs are transferred to nerve impulses and transmitted to the brain.

_____ 3. The pinna catches sound waves and directs them into the external auditory canal.

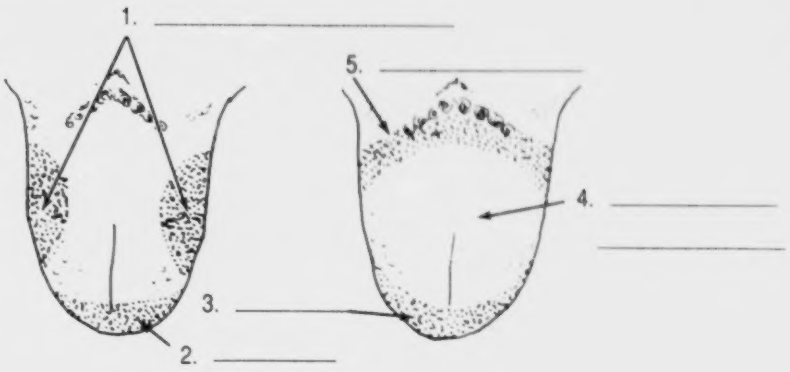
_____ 4. Fluid filling the cochlea causes tiny hairs on the basilar membrane to vibrate.

_____ 5. Sound waves make the tympanic membrane vibrate.

_____ 6. Vibrations are passed through the oval window into the cochlea.

OBJECTIVE 9

Label areas of taste. Write the name in the blank.



May be photocopied for student use.

OBJECTIVE 10

Choose the word or phrase that completes statements about the reactions of taste buds. Write the correct letter in the blank.

_____ 1. Taste buds relay impulses to

- a. the salivary nerve
- b. the first cranial nerve
- c. two different nerves
- d. taste bud nerves

_____ 2. The tongue is covered with bumps called

- a. taste buds
- b. papillary buds
- c. papillae
- d. taste pods

_____ 3. Each taste bud contains

- a. receptor cells
- b. salivary nerves
- c. salivary glands
- d. receptor glands

OBJECTIVE 11

Select from a list true statements about the sense of smell. Write and "X" in the blank before each true statement.

_____ 1. Sense of smell is closely related to the sense of taste.

_____ 2. Receptors are located in the olfactory epithelium in the upper part of the nasal cavity.

_____ 3. Smells are sent to the brain via the optic nerve.

_____ 4. Olfactory nerve carries smell impulses to the brain.

May be photocopied for student use.

_____ 5. Odors seem stronger after long periods of time because the olfactory nerves become more sensitive the longer the odor is smelled.

_____ 6. Olfactory nerves tire quickly and become less sensitive after detecting the same odor for a period of time.

_____ 7. The olfactory nerve, located in the nasal cavity, contains receptors.

NOTE: Objective 12 is evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

THE SPECIAL SENSES

XV

OBJECTIVE 1

Part 1

1.	b	6.	k
2.	a	7.	d
3.	f	8.	i
4.	n	9.	l
5.	g	10.	h

Part 2

1.	a	6.	d
2.	l	7.	i
3.	b	8.	j
4.	m	9.	h
5.	f		

OBJECTIVE 2

Basic senses

- Hunger and thirst
- Touch, pressure, temperature, and pain
- Position and balance

Special senses

- Vision
- Hearing
- Taste
- Smell

OBJECTIVE 3

1. Conjunctiva
2. Iris
3. Lens
4. Anterior chamber or aqueous humor
5. Cornea
6. Suspensory ligament
7. Posterior chamber

8. Ciliary muscle
9. Sclera
10. Choroid
11. Retina
12. Optic nerve
13. Vitreous humor
14. Superior rectus muscle
15. Oculomotor nerve
16. Trigeminal nerve
17. Mandibular nerve
18. Maxillary nerve
19. Optic nerve
20. Inferior rectus muscle
21. Maxillary sinus
22. Lower eyelid
23. Upper eyelid
24. Ophthalmic nerve
25. Frontal sinus
26. Ganglion
27. Levator upper eyelid

OBJECTIVE 4

Part 1				Part 2			
1.	c	6.	i	1.	b	6.	c
2.	e	7.	m	2.	k	7.	f
3.	k	8.	o	3.	d	8.	i
4.	d	9.	g	4.	m	9.	l
5.	a	10.	h	5.	j		

OBJECTIVE 5

1. E
2. I
3. I
4. E

OBJECTIVE 6

1. 2
2. 4
3. 1
4. 6
5. 3
6. 5

OBJECTIVE 7

1. Pinna or auricle
2. External auditory canal
3. Tympanic membrane or eardrum
4. Stapes
5. Round window
6. Eustachian tube
7. Vestibule
8. Cochlea
9. Oval window
10. Semicircular canals
11. Incus
12. Malleus

OBJECTIVE 8

1. 3
2. 6
3. 1
4. 5
5. 2
6. 4

OBJECTIVE 9

1. Sour
2. Sweet or sugar
3. Salt
4. No taste
5. Bitter

OBJECTIVE 10

1. c
2. c
3. a

OBJECTIVE 11

1, 2, 4, 6

OBJECTIVE SHEET

THE ENDOCRINE SYSTEM

XVI

INTRODUCTION

Our body functions are controlled by chemicals and chemical reactions. Some of these chemicals are called hormones, produced by the glands that make up the endocrine system. These hormones control our growth, emotions, and bodily functions. The endocrine system meets needs indicated by positive and negative feedback to maintain homeostasis. When health problems occur in the endocrine system, many systems and functions are affected.

UNIT OBJECTIVE

After completing this unit the student will be able to identify the glands and hormones in the endocrine system. The student will demonstrate these competencies by completing assignments sheets and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the endocrine system to their definitions.

2. Complete a chart about major endocrine glands, their hormones, and functions.

3. Label the endocrine glands.

4. Choose the word or phrase that completes statements about endocrine glands and their products (hormones).

5. Communicate about how an endocrine gland functions. (Assignment Sheet)

PREPARATION

- Review the unit and plan your presentation.
- Study the specific objectives to determine those you will cover in your presentation. Decide also which objectives should be taught to which students.
- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.
- Review teaching suggestions and plan classroom activities.
- Determine how you will schedule time for students to demonstrate competence in the required procedures.
- Order materials to supplement the unit. Models of the endocrine system are available from Health Edco, P.O. Box 21207, Waco, Texas 76702-9964, 1-800-299-3360.
- Invite an endocrinologist or internal specialist to discuss the functions of the endocrine system.

  NOTE: Supply guest speakers with the objective sheet, information sheet and any other components you want them to cover.
- **HOSA** Integration
  - Assist students in conducting a chapter service project related to the unit information.
  - Develop objectives for the service project, identify a theme, and set a time line.
  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.
  - Arrange for photographs of all public speaking, presentations, or other public contact.
  - Host terminology and spelling contests.
  - Assist students in scheduling and presenting prepared and extemporaneous speeches.

- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.
- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.
- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Objective 1: Match terms associated with the endocrine system to their definitions.

- Review terms and definitions. Note the prefixes and suffixes used.
- Discuss what the students already know about some of the terms. "Steroid," for example, will probably be familiar, but might not be understood.
- Students will probably be familiar with hormones, but may be unaware of their variety and functions. Discuss hormones before covering the unit to determine their misconceptions.

Objective 2: Complete a chart about major endocrine glands, their hormones, and their functions.

Objective 3: Label the endocrine glands.

- Use Transparency Master 1 to locate major glands.
- Present photographs of various glands.
- Have students list medical conditions related to the various glands.

Objective 4: Choose the word or phrase that completes statements about endocrine glands and their products (hormones).

- Have students compare the nervous and endocrine systems. Have them give reasons for similarities and differences.
- Have students suggest examples of one gland affecting another.
- Most students will connect hormones to premenstrual emotions. Inform students that just before menstruation, the level of testosterone rises, nearing that of the normal male.

Objective 5: Communicate about how an endocrine gland functions.

- Have students complete the assignment sheet.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.

- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

SUGGESTED ACTIVITIES

Electronic Media

- The following are available from Opportunities for Learning, Inc., 941 Hickory Land, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

  Anatomy and Physiology Filmstrips, Unit 12, The Endocrine System. Each filmstrip comes with a cassette and instructor's guide.

  Diabetes and Complications: Focus on Living, a 20-minute color film discussing how diabetes affects nine different people and how they deal with the disease.

  Human Systems Filmstrip Sets; Endocrine System in the Human Body, filmstrip with cassette and student instruction booklet. Covers endocrine glands, hormones, and control mechanisms.

  The Other Diabetes, a 21-minute color film discusses undetected Type II Diabetes and efforts to find the estimated 5,000,000 undiagnosed cases.

  Your Body Video and Filmstrip Series; Your Body: Series III, a 51-minute video from filmstrip covers the nervous system, brain, and endocrine system. Each gland in the endocrine system is identified and discussed.

Print Media

- *The Human Biology Series*, Health Edco, P.O. Box 21207, Waco, TX 76702-9964, 1-800-299-3366. A set of 132 color transparencies and 132 spirit masters covering all body systems. Associated with this unit is #AH78114 (11 overhead transparencies) and #AH78127 (11 spirit masters).

- *Schick Anatomy Charts*, Opportunities for Learning, Inc., 941 Hickory Land, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700. 8.5" x 11" charts and overlays cover most body systems. Charts applicable to this unit include "Endocrine Glands" and "Endocrine System--Interrelations."

Software

- The following are available from Opportunities for Learning, Inc., 941 Hickory Land, Dept. XN, P.O. Box 8103, Mansfield, OH 44901-8103, 419-589-1700.

  Experiments in Human Physiology uses the computer to measure various physical responses, including homeostasis and other endocrine system-related measurements. Can be run on an Apple computer. 48K

  The Human Systems Software System; Human Systems - Series II includes tutorials, gasses, and approaches as well as a lesson planner, objectives, scoring criteria, and program sequence. Series II covers the muscular.

UNIT REFERENCES

- Duncan, Betty, *Allied Health Careers*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma 74074.

- Rogers, Helen V., *Practical Nursing 1*, Oklahoma Department of Vocational and Technical Education, Stillwater, Oklahoma 74074.

ENDOCRINE RELATIONSHIPS

Glands are printed in boldface type; hormones in italic type.

ANTERIOR PITUITARY

- *Growth hormone (GH)*
  - — promotes growth of body cells
- *Follicle-stimulating hormone (FSH)*
  - — stimulates ovary to produce ova (follicles) → → → → → → → → →

    OVARY
    - *Estrogen*
      - — readies eggs for ovulation
      - — stimulates development of secondary sex characteristics and reproductive organs
  - — stimulates testes to produce sperm → **TESTES**
- *Prolactin*
  - — stimulates milk production and secretion
- *Luteinizing hormone (LH)*
  - — triggers ovulation of egg from ovary and causes the ruptured follicle to be converted to the corpus luteum → →

    OVARY
    - *Progesterone*
      - — produced by the corpus luteum
      - — prepares the uterus for the fertilized egg and helps maintain pregnancy
  - — stimulates testes to produce testosterone → → → → → → → →

    TESTES
    - *Testosterone*
      - — stimulates development of secondary sex characteristics and reproductive organs
- *Thyroid-stimulating hormone (TSH)*
  - — controls secretions of hormones by thyroid gland → → → → → → → →

    THYROID
    - *Thyroxine*
      - — controls rate of metabolism
- *Adrenocorticotropic hormone (ACTH)*
  - — regulates adrenal cortex → → → →

    ADRENAL CORTEX
    - *Mineralocorticoids (aldosterone)*
      - — maintains fluid and electrolyte balance
    - *Glucocorticoids (cortisone)*
      - — helps maintain normal metabolism and resist stress
      - — reduces inflamation

May be photocopied for student use.

POSTERIOR PITUITARY

- *Oxytocin*
  - — stimulates uterine contractions during labor
  - — stimulates milk ejection for nursing
- *Antidiuretic (ADH)*
  - — increases reabsorption of water and electrolytes

PARATHYROID

- *Parathormone or Parathyroid hormone (PTH)*
  - — regulates calcium and phosphorus level of blood

ADRENAL MEDULLA

- *Epinephrine and norepinephrine*
  - — produces effects like those of the autonomic nervous system
  - — stimulates "fight or flight" response
  - — helps resist stress, provides stabilizing force

ISLETS OF LANGERHANS (PANCREAS)

- *Insulin*
  - — helps regulate blood sugar level by lowering it
- *Glucagon*
  - — helps regulate blood sugar level by raising it

THYMUS

- *Thymosin*
  - — helps with development of some of the cells critical to the immune system

May be photocopied for student use.

THE ENDOCRINE SYSTEM

OBJECTIVE 1

Match terms associated with the endocrine system to their definitions.

- **endocrine glands** — ductless glands that internally secrete directly into the blood which transports secretions throughout the body

  EXAMPLE: the thyroid gland secretes thyroxin directly into the bloodstream.

- **endocrinology** — the study of the endocrine system

  NOTE: "Endocrine" means "secrete within."

- **exocrine glands** — glands whose secretions reach the external epithelial surface either directly or through a duct

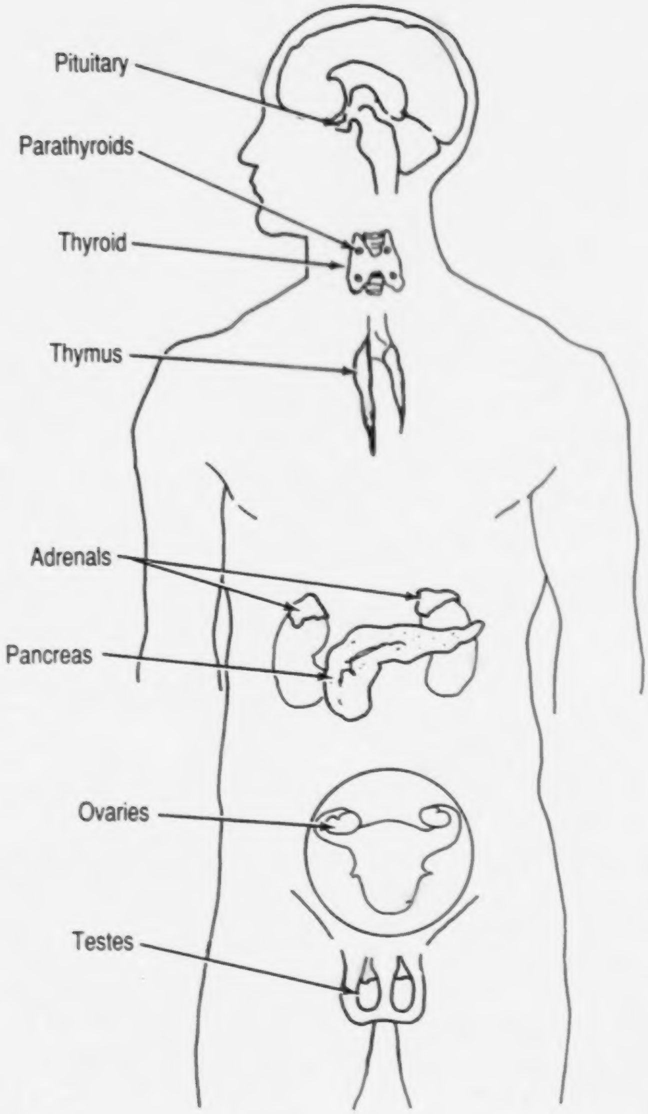
  EXAMPLE: Sweat glands and glands that secrete digestive juices into the digestive tract, which leads outside the body.

- **hormone** — internal secretion of a gland or an organ which regulates a body function
- **hypersecretion** — excessive secretion
- **hyposecretion** — inadequate secretion
- **permissive relationship** — a situation in which the presence of one hormone is essential for the action of another
- **steroid** — an organic compound derived from fats
- **synergistic relationship** — harmonious action of two hormones producing a response greater that the total effect of each hormone operating by itself

OBJECTIVE 2 | **Complete a chart about major endocrine glands, their hormones, and their functions.**

GLAND	HORMONE	FUNCTION
Pituitary		
• Anterior	Prolactin ACTH (adrenocorticotropic hormone) TSH (thyroid-stimulating hormone) FSH (follicle-stimulating hormone) LH (luteinizing hormone) or ICSH (interstitial cell-stimulating hormone) GH (growth hormone) MSH (melanocyte-stimulating hormone)	Controls secretions of other glands such as the thyroid, adrenal cortex, and mammary and stimulates growth and reproductive activities
• Posterior	Oxytocin	Stimulates contractions during labor and stimulates the mammary glands for nursing
	ADH (antidiuretic hormone)	Prevents excessive urine production and raises blood pressure during severe bleeding
Thyroid	Thyroxine	Controls rate of metabolism
Parathyroid	Parathormone	Regulates calcium and phosphorous metabolism
Pancreas	Insulin from the Islets of Langerhans	Regulates blood sugar level
Ovaries	Estrogen and progesterone	Stimulates development and maintenance of female reproductive organs and characteristics
Testes	Testosterone	Stimulates development and maintenance of male reproductive organs and characteristics
Adrenal		
• Medulla	Epinephrine and norepinephrine	Prepares body for fight or flight; aids in dealing with short-term stress
• Cortex	Corticosteroids	Aids body in coping with long-term stress or infection
Thymus	Thymosin	Aids infants and children in developing immunity

OBJECTIVE 3 | **Label the endocrine glands.**


Pituitary
Parathyroids
Thyroid
Thymus
Adrenals
Pancreas
Ovaries
Testes

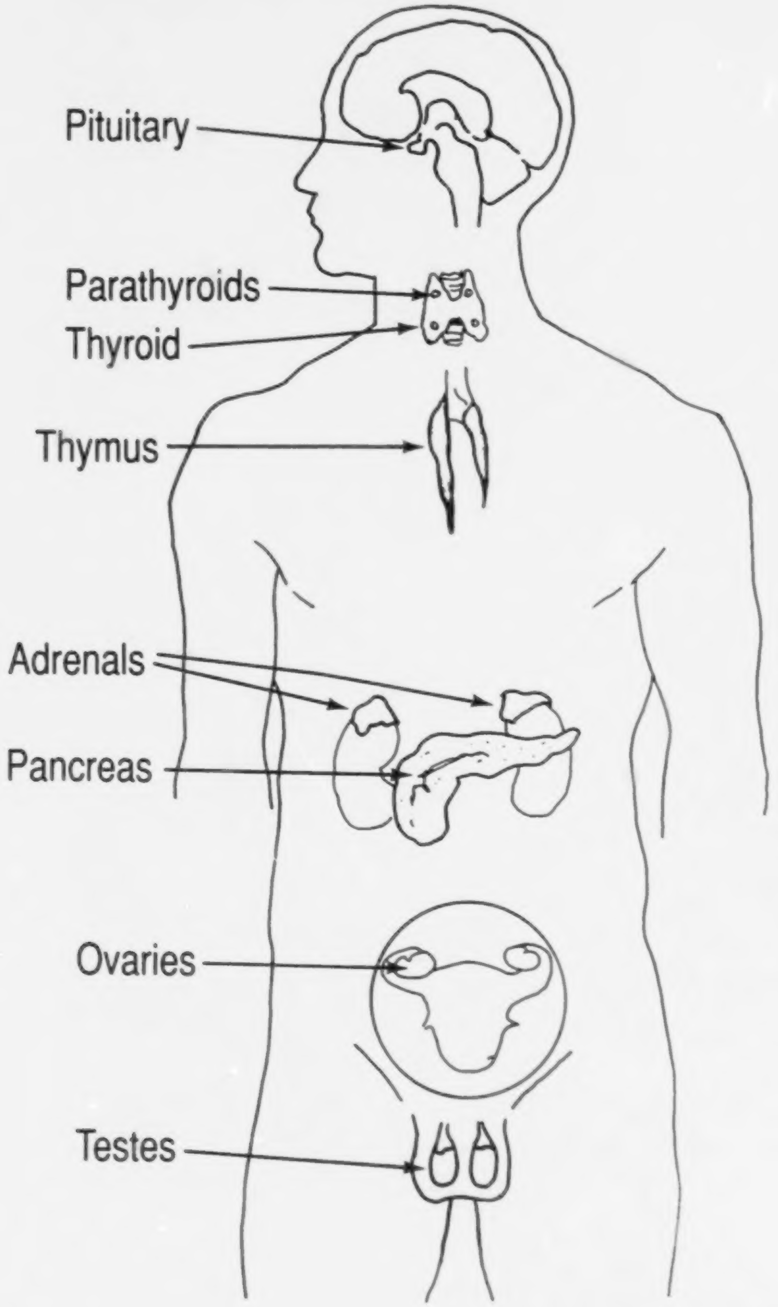
811

OBJECTIVE 4

Choose the word or phrase that completes statements about endocrine glands and their products (hormones).

- Endocrine glands are located in widely separated parts of the body.
- They are closely related to the nervous system in regulatory action. The regulatory actions of the nervous and the endocrine systems differ in the speed and duration of response.
- Nerve action usually occurs in a fraction of a second and lasts only as long as the stimulation is present. Endocrine action is slower and produces a more prolonged stimulation and regulation.
- Endocrine glands are composed of epithelial and connective tissue. Because they are also very vascular, they often present a bleeding problem in surgery.
- Hormones produced by the glands have interrelated actions; hormones from one gland can act upon another gland. The concentration of one hormone can influence the concentration of other hormones.
- Hormones have a profound effect upon growth, development, and personality of an individual.
- Most hormones are steroids and proteins and have specific functions.

Endocrine Glands


Pituitary
Parathyroids
Thyroid
Thymus
Adrenals
Pancreas
Ovaries
Testes

813

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization

  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language

  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing self confidence/esteem

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

- As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

- Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

- Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

- Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:
  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.
  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.
- If students have difficulty adapting their presentation to a specific audience:
  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.
  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.
- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.
- If students have difficulty developing self confidence/esteem:
  - Ask students to name some things that they can do well now that they didn't do as well when they first learned how. Tell them that everything they do will get easier with experience so the more experience they can get before actually starting to work, the more confident they will be on the job.

- Encourage those students who need to develop their self confidence and esteem by providing opportunities for them have successful experiences. Provide as many, or more, positive comments as negative comments when evaluating the activity found on the Assignment Sheet. Be sure that all negative comments are constructive and include suggestions for improving or correcting the problems.

- Allow the students to work in heterogenous groups to enable the less confident students to learn from the more confident students. The activities found on the assignment and activity sheets throughout this book are designed to provide opportunities for students to experience success.

ASSIGNMENT SHEET

THE ENDOCRINE SYSTEM XVI

Name ______________________________ Score ____________

OBJECTIVE 5 **Communicate about how an endocrine gland functions.**

INTRODUCTION Understanding how the various endocrine glands function is important to promoting good health practices and to discussing the endocrine glands with clients.

DIRECTIONS Choose one gland and create a poster, pamphlet, brochure, oral report or skit on how the gland functions. Present the project to your class.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (written, oral, practical)

Job Acquisition/ Development Skills
- Develop self confidence/esteem

ASSIGNMENT SHEET

The project should meet all HOSA guidelines and contain current, useful, and correct information.

WRITTEN TEST

THE ENDOCRINE SYSTEM

XVI

Name ______________________ Score __________

OBJECTIVE 1

Match terms associated with the endocrine system to their definitions. Write the correct letter in the blank.

_____ 1. Internal secretion of a gland or an organ which regulates a body function

_____ 2. A situation in which the presence of one hormone is essential for the action of another

_____ 3. The study of the endocrine system

_____ 4. Harmonious action of two hormones producing a response greater than the total effect of each hormone operating by itself

_____ 5. Excessive secretion

_____ 6. An organic compound derived from fats

_____ 7. Inadequate secretion

_____ 8. Glands whose secretions reach the external epithelial surface either directly of through a duct

_____ 9. Ductless glands that internally secrete directly into the blood which transports secretions throughout the body

a. disciplined relationship

b. endocrine glands

c. endocrinology

d. exocrine glands

e. exocrinology

f. fat

g. hormone

h. hypersecretion

i. hyposecretion

j. permissive relationship

k. steroid

l. synergistic relationship

m. synthetic

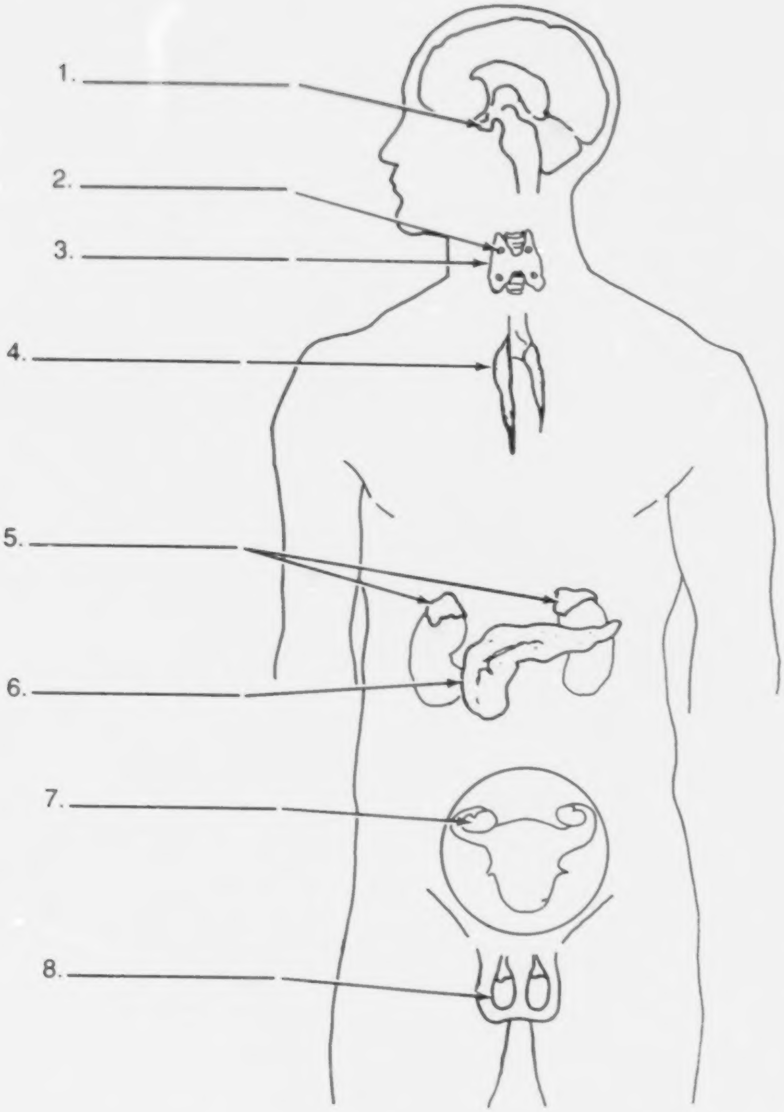
May be photocopied for student use.

OBJECTIVE 2 **Complete a chart about major endocrine glands, their hormones, and functions.**

GLAND	HORMONE	FUNCTION
1.		
• 2.	Prolactin ACTH (adrenocorticotropic hormone) TSH (thyroid-stimulating hormone) FSH (follicle-stimulating hormone) LH (luteinizing hormone) or ICSH (interstitial cell-stimulating hormone) GH (growth hormone) MSH (melanocyte-stimulating hormone)	Controls secretions of other glands such as the thyroid, adrenal cortex, and mammary and stimulates growth and reproductive activities
• 3.	Oxytocin	Stimulates contractions during labor and stimulates the mammary glands for nursing
	ADH (antidiuretic hormone)	Prevents excessive urine production and raises blood pressure during severe bleeding
4.	Thyroxine	Controls rate of metabolism
5.	Parathormone	Regulates calcium and phosphorous metabolism
6.	Insulin from the Islets of Langerhans	Regulates blood sugar level
7.	Estrogen and progesterone	Stimulates development and maintenance of female reproductive organs and characteristics
8.	Testosterone	Stimulates development and maintenance of male reproductive organs and characteristics
9.		
• 10.	Epinephrine and norepinephrine	Prepares body for fight or flight; aids in dealing with short-term stress
• 11.	Corticosteroids	Aids body in coping with long-term stress or infection
12.	Thymosin	Aids infants and children in developing immunity

May be photocopied for student use.

OBJECTIVE 3 **Label the endocrine glands**



May be photocopied for student use.

OBJECTIVE 4

Choose the word or phrase that completes statements about endocrine glands. Write the correct letter in the blank.

_____ 1. Endocrine glands present a problem in surgery because they

a. are so close to vital organs

b. are very vascular and bleed profusely

c. are interrelated and surgery on one affects the others

d. can create serious nervous system problems

_____ 2. Endocrine glands are closely related to the

a. circulatory system

b. respiratory system

c. nervous system

d. muscular system

_____ 3. Hormones from one gland

a. harm all other glands

b. are necessary for the health of all other glands

c. have no effect on any other gland

d. can act upon another gland

_____ 4. Most hormones are steroids or

a. fats

b. acids

c. starches

d. proteins

NOTE: Objective 5 is evaluated on the job sheet/assignment sheet in this unit. If you have not completed these components, see your instructor.

823

WRITTEN TEST ANSWERS

THE ENDOCRINE SYSTEM

XVI

OBJECTIVE 1

1. g
2. j
3. c
4. l
5. h
6. k
7. i
8. d
9. b

OBJECTIVE 2

1. Pituitary
2. Anterior
3. Posterior
4. Thyroid
5. Parathyroid
6. Pancreas
7. Ovaries
8. Testes
9. Adrenal
10. Medulla
11. Cortex
12. Thymus

OBJECTIVE 3

1. Pituitary
2. Parathyroids
3. Thyroid
4. Thymus
5. Adrenals
6. Pancreas
7. Ovaries
8. Testes

OBJECTIVE 4

1. b
2. c
3. d
4. d

OBJECTIVE SHEET

THE REPRODUCTIVE SYSTEM XVII

INTRODUCTION

The reproductive system has affected all our lives and all our societies. Fertilization, birth, menstruation, and maturation change our lives and our laws. As health care professionals, you will be expected to know current, accurate information on this topic. You will also be expected to be able to discuss and explain what many people are uncomfortable discussing.

UNIT OBJECTIVE

After completing this unit the student will be able to identify structures and functions of the male and female reproductive systems and stages in growth and in menstruation. The student will demonstrate these competencies by completing an assignment sheet and the written test with a minimum of 85 percent accuracy.

SPECIFIC OBJECTIVES

After completing this unit, the student will be able to:

1. Match terms associated with the reproductive system to their definitions.
2. List functions of male and female reproductive systems.
3. Select from a list secondary sex characteristics in males and females.
4. Label parts of the male reproductive system and adjacent structures.
5. Match male reproductive structures to their functions.
6. Label parts of the female reproductive system and adjacent structures.
7. Match female reproductive structures to their functions.
8. Distinguish among stages of the 28-day menstrual cycle.
9. Describe physiological changes occurring during menopause.
10. Communicate about how the reproductive system functions. (Assignment Sheet)

825

PREPARATION

- Review the unit and plan your presentation.

- Study the specific objectives to determine those you will cover in your presentation. Also decide which objectives should be taught to which students.

- Determine the scope and sequence of objectives that you add. Design and develop support materials, including evaluation techniques, for additional objectives.

- Review teaching suggestions and plan classroom activities.

- Determine how you will schedule time for students to demonstrate competence in the required procedures.

- Order materials to supplement the unit.

- Invite an OB/GYN or urologist to discuss the structures and functions of the reproductive systems. Consider inviting a social worker or AIDS counselor to discuss reproduction system-related concerns. Invite a nurse working in an OB/GYN office to discuss the role of the nurse in this field.

  NOTE: Supply guest speakers with the Objective Sheet, Information Sheet and any other components you want them to cover. Contact speakers and confirm the date and time 2-3 days before they are scheduled to appear.

- **HOSA** Integration

  - Assist students in conducting a chapter service project related to the unit information.

  - Develop objectives for the service project, identify a theme, and set a time line.

  - Plan a community or school health project that involves disseminating pamphlets about unit material. Keep copies of all material, including scripts, for HOSA competition.

  - Arrange for photographs of all public speaking, presentations, or other public contact.

  - Host terminology and spelling contests.

- Assist students in scheduling and presenting prepared and extemporaneous speeches.

- Create a poster according to Extemporaneous Health Display rules. Display it in a highly visible area.

- Create overhead transparencies, 35 mm slides, brochures, flyers, narrative tape recordings, and video tapes according to Community Awareness Guidelines.

- Create a skit, play, or puppet show and present it. Tape the presentation, according to Community Awareness Guidelines.

DELIVERY

Discuss objectives.

- As you begin the unit, you may want to include discussions on stages of pregnancy and delivery, ethics as they pertain to abortion or sexually transmitted diseases, or other related topics.

- Students may have difficulty discussing these topics. Desensitize them by using these activities:

    - Separate students into groups of three. Give each a proper anatomical term such as breast, penis, or anus. Have the group list all the terms they know that mean the same thing.

    - Have students color pictures of reproductive system structures.

    - Have students make models of reproductive system structures.

Objective 1: Match terms associated with the reproductive system to their definitions.

- This unit contains an unusually long list of terms. Students will probably be familiar with most of these terms, but meanings may not be totally clear.

- Add to the list terms dealing with topics of current interest. Consider including reproductive system diseases or therapies.

Objective 2: List functions of male and female reproductive systems.

- Have students discuss how the need to reproduce has affected our history.

827

- Have them contrast Victorian morals to today's views or contrast our culture's views on sexuality to those of other cultures.

Objective 3: Select from a list secondary sex characteristics in males and females.

- Have students suggest other changes that occur at puberty—physically, emotionally, and socially.
- Explain the difference between primary and secondary sex characteristics.

Objective 4: Label parts of the male reproductive system and adjacent structures.

Objective 5: Match male reproductive structures to their functions.

- Discuss common reproductive system problems and their causes.
- Discuss tests that men should undergo regularly.
- Use Transparency Master 1 to explain the system.
- Have students complete Activity Sheet 1.

Objective 6: Label parts of the female reproductive system and adjacent structures.

Objective 7: Match female reproductive structures to their functions.

- Discuss common contraceptives, how they function, and their possible side effects.
- Discuss common tests and how they are conducted.
- Discuss changes in the female system from birth to old age.
- Use Transparency Masters 2, 3, 4, and 5 to explain the system.
- Have students complete Activity Sheet 2.

Objective 8: Distinguish among stages of the 28-day menstrual cycle.

- Discuss variations in the 28-day cycle. Explain that few women are actually on a 28 day cycle, but that most cycles are close to 28 days and follow the same series of occurrences.

- Compare the reproductive and endocrine systems.
- Have students list symptoms of upcoming menstruation and discuss their causes.
- Use Transparency Master 6 to illustrate the cycle.
- Have students complete Activity Sheet 3.

Objective 9: Describe physiological changes occurring during menopause.

- Have students list symptoms of menopause.
- Discuss hormone replacement therapy.
- Compare female and male changes with aging.

APPLICATION

Objective 10: Communicate about how the reproductive system functions.

- Have students complete the assignment sheet to meet HOSA guidelines.
- Use the assignment sheet to discuss current topics or concerns.

EVALUATION

Written test

- Explain to students that they will be asked to demonstrate on the written test actions listed in the specific objectives.
- Give the written test.

  NOTE: The written test may be given in sections if desired.
- Evaluate students on assignment sheet activities if not previously done.
- Reteach and retest if necessary.
- Complete appropriate section of competency profiles.
- Review individual and group performance in order to evaluate teaching methods. Adjust scope, sequence, or instructional approaches for additional lessons as required.

829

SUGGESTED RESOURCES

Electronic Media

- *Curriculum and Instructional Materials Center*, Oklahoma Department of Vocational and Technical Education, 1500 W. Seventh Avenue, Stillwater, OK 74074. Offers the following films on a free-loan basis to Oklahoma teachers:

  A Baby is Born. Shows a literal, photographic record of an actual hospital delivery. Designed to inform future parents adequately and honestly about normal childbirth. (30 minutes, color, VHS)

  Everyday Miracle: Birth. The miraculous nature of birth and the development of the unborn child becomes apparent in this unique documentary. Advanced techniques in microphotography provide stunning pictures of the development of a living human embryo. Combined with ultrasound recordings, this film yields a comprehensive record of life before birth. (22 minutes, color, VHS)

  Having Your Baby: Cesarean Birth. Both planned and emergency C-sections are discussed. Film includes viewing a C-section delivery as well as observing the steps involved in the process. (20 minutes, color, VHS)

  The Miracle of Life. This program takes you on an incredible voyage through the human body as a new life begins. All stages of development are covered including the release of the egg from the ovary, actual conception, the development from a single cell into an embryo, the formation of the fetus, and ultimately the extraordinary process of birth. (60 minutes, color, VHS)

Print Media

- Ammer, Christine. *The New A to Z of Women's Health: A Concise Encyclopedia*. Nurse's Book Society: Delran, NJ.

- Bell, Ruth, et al. *Changing Bodies, Changing Lives: Revised and Updated*. Sequel to *Our Bodies, Ourselves*. Nurse's Book Society: Delran, NJ.

- Cunningham, F. Gary, Paul C. MacDonald, and Norman F. Grant. *Williams Obstetrics*. Nurse's Book Society: Delran, NJ.

- Lark, Susan M. *Premenstrual Syndrome Self-Help Book: A Woman's Guide to Feeling Good All Month*. Nurse's Book Society: Delran, NJ.

- Lauersen, Niels, and Steven Whitney. *A Woman's Body: The New Guide to Gynecology*. Nurse's Book Society: Delran, NJ.

- Poorman, Susan G. *Human Sexuality and Nursing.* Nurse's Book Society: Delran, NJ.

UNIT REFERENCES

- Fong, Elizabeth, Elvira B. Ferris, and Esther G. Skelley. *Body Structures and Functions.* Delmar Publishers: Albany, NY 1989.
- Milliken, Mary Elizabeth and Gene Campbell. *Essential Competencies for Patient Care.* The C.V. Mosby Company: St. Louis, 1985.
- Rogers, Helen V. *Practical Nursing Volume 1.* Oklahoma State Department of Vocational and Technical Education, Stillwater, OK 1981.

831

THE REPRODUCTIVE SYSTEM *XVII*

OBJECTIVE 1

Match terms associated with the reproductive system to their definitions.

- **broad ligament** – the fold of peritoneum that supports the uterus
- **circumcision** – surgical removal of the prepuce

  NOTE: The prepuce is the foreskin. See the definition below.
- **climacteric** – period that marks the cessation of the reproductive function in the female or diminishing testicular activity in the male
- **endometrium** – mucous membrane lining of the uterus
- **fertilization** – the process by which the sperm unites with the ovum
- **glans penis** – the head of the penis
- **gonad** – organ that produces male or female reproductive cells–ovaries in females, testes in males

  NOTE: The gonads develop in the embryo, but do not really begin to function until puberty when they gradually become functional, begin to produce sperm or ovum, and secrete hormones that influence the development of secondary sex characteristics.
- **graafian follicle** – mature ovarian follicle

  NOTE: Only one follicle, of the many follicles found in the ovaries, matures into a graafian follicle each month
- **gynecology** – study of the female reproductive system
- **lactiferous ducts** – ducts that pass milk through the nipple
- **menarche** – beginning of menstruation
- **menopause** – normal condition when the production of the ovum ceases, resulting in permanent cessation of menstrual activity
- **menses** – monthly flow of uterine lining

- **menstruation** — periodic discharge of blood and tissues from the non-pregnant uterus
- **obstetrics** — branch of medicine that deals with management of pregnancy, labor, delivery, and post-partum care
- **ovum** — female reproductive cell
- **perineum** — area between external genitalia and anus
- **prepuce** — foreskin or fold of skin over the glans penis
- **puberty** — period at which one becomes capable of reproduction

  NOTE: Humans are born with all reproductive organs. These organs grow slowly until puberty, then mature.

- **pubic** — pertaining to the ox pubis, the anterior bone of the pelvis
- **reproduction** — process by which a living organism produces a new individual of the same kind
- **scrotum** — external pouch that contains the testes
- **secondary sex characteristics** — physical changes related to gender, but not involved in reproduction

  EXAMPLES: men's beards, voice change

- **semen** — thick, white secretion of the male reproduction gland
- **spermatic cord** — cord suspending the testes and containing the veins, arteries, lymphatics, nerves, and vas deferens
- **spermatozoa** — male reproductive cell
- **viable** — capable of maintaining an independent existence
- **viscid** — thick, sticky
- **vulva** — external female genitalia

833

OBJECTIVE 2 **Select from a list functions of male and female reproductive systems.**

- Perpetuation of the human species
- Sexual gratification
- Secretion of hormones

OBJECTIVE 3 **Select from a list secondary sex characteristics in males and females.**

Males

NOTE: Characteristics appear at puberty, approximately 12-14 years of age.

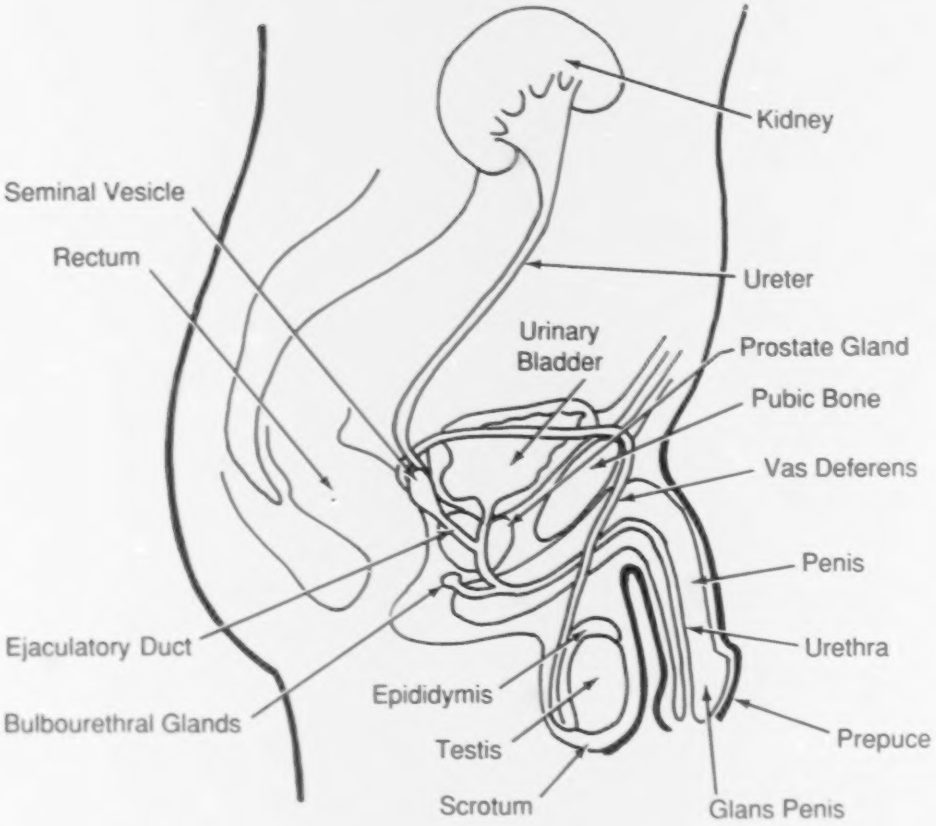
- Change in musculoskeletal development with broader shoulders, narrow hips, and firmer muscles
- Increase in activity of sudoriferous and sebaceous glands
- Growth of beard, pubic, and axillary hair with general increase of hair growth all over body
- Change in voice to deeper tones

Females

NOTE: Characteristics appear at puberty, approximately 10-12 years of age.

- Enlargement of breasts
- Appearance of pubic and axillary hair
- Menarche
- Changes in body contours due to increase in growth and fatty deposits

OBJECTIVE 4 | **Label parts of the male reproductive system and adjacent structures.**


Kidney
Seminal Vesicle
Rectum
Ureter
Urinary Bladder
Prostate Gland
Pubic Bone
Vas Deferens
Penis
Ejaculatory Duct
Urethra
Epididymis
Bulbourethral Glands
Prepuce
Testis
Scrotum
Glans Penis

OBJECTIVE 5

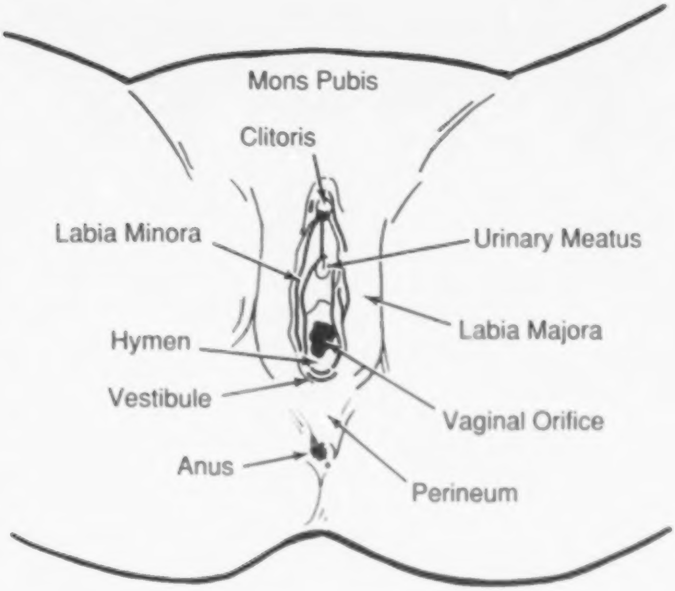
Match male external and internal reproductive organs to their functions.

- **bulbourethral or Cowper's gland** -- secretes clear, viscid, alkaline fluid which removes urine residue and serves as a lubricant
- **epididymis** -- collects and stores sperm while they mature; conducts sperm to the vas deferens
- **penis and urethra** -- carries semen into vagina during copulation, carries urine from bladder
- **prostate gland** -- secretes alkaline fluids which enhance sperm mobility
- **scrotum** -- sac that contains the testes and helps regulate and maintain favorable temperature for sperm production and survival
- **seminal vesicles** -- contribute essential components to semen
- **seminiferous tubules** -- part of the testes that produce sperm
- **testes** -- paired glands that produce sperm and testosterone

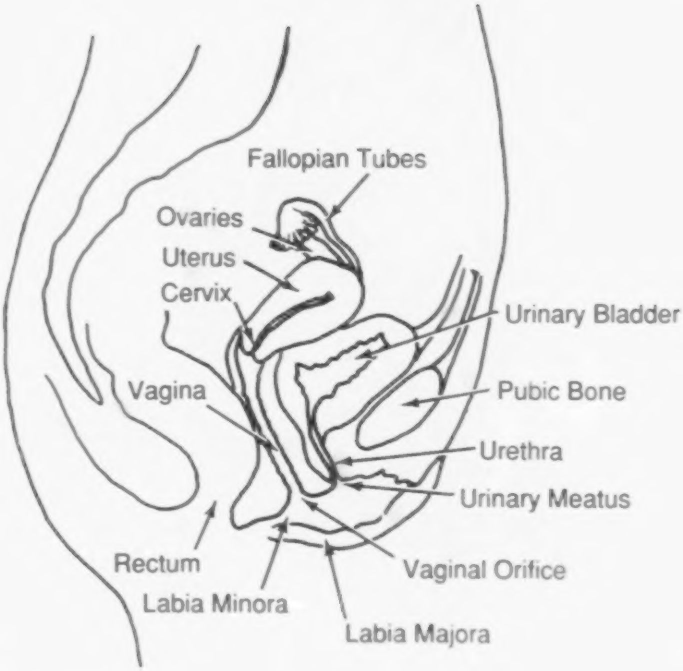
  NOTE: Temperature can affect sperm. To protect sperm, the scrotum contracts, drawing the testes closer to the body for increased warmth; or drops, removing them from body heat for decreased warmth.

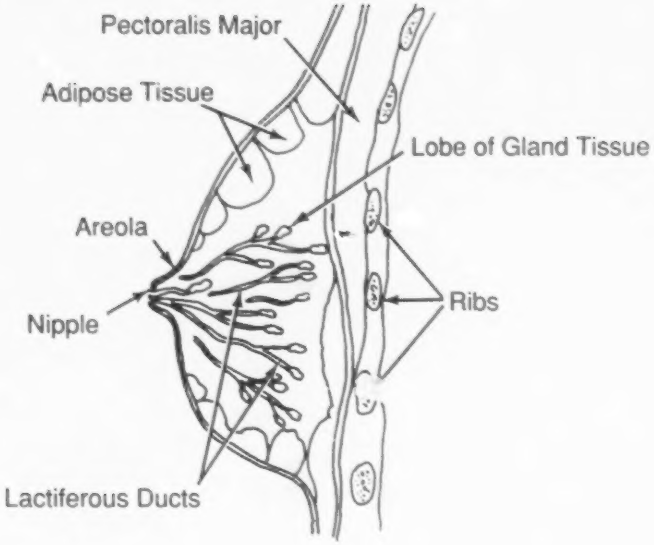
- **vas deferens** -- transports sperm from the epididymis to the urethra; contracts its smooth muscles to aid ejaculation

OBJECTIVE 6 **Label parts of the female reproductive system and adjacent structures.**


Mons Pubis
Clitoris
Labia Minora
Urinary Meatus
Labia Majora
Hymen
Vestibule
Vaginal Orifice
Anus
Perineum

837


Fallopian Tubes
Ovaries
Uterus
Cervix
Urinary Bladder
Pubic Bone
Vagina
Urethra
Urinary Meatus
Rectum
Vaginal Orifice
Labia Minora
Labia Majora


Pectoralis Major
Adipose Tissue
Lobe of Gland Tissue
Areola
Ribs
Nipple
Lactiferous Ducts

OBJECTIVE 7 **Match female reproductive structures to their functions.**

- **Bartholin's and Skene's glands** – secrete lubricating fluid
- **clitoris** – produces sexual excitement
- **fallopian tubes (uterine tubes, ova ducts)** – pathway for movement of the ova from ovaries to uterus

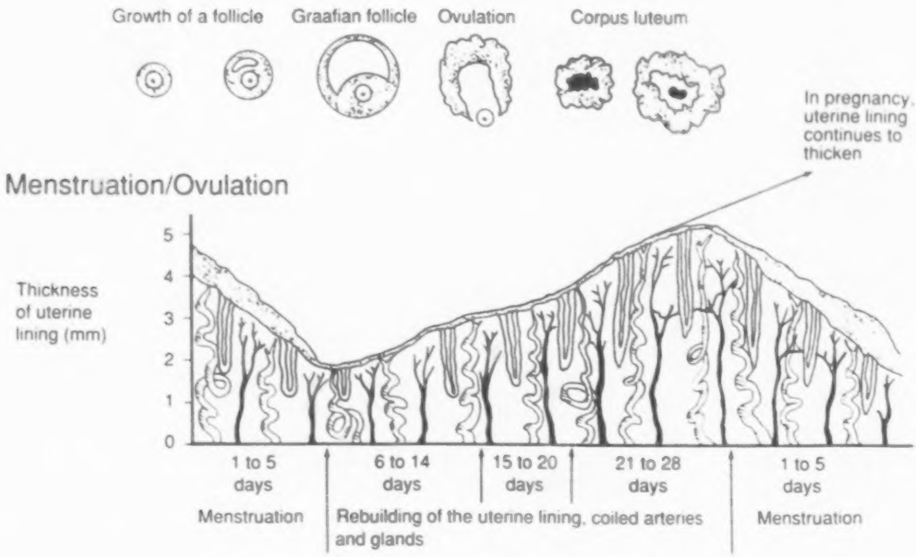
  NOTE: Fertilization usually occurs in the distal third of the tube.
- **labia majora** – surrounds labia minora
- **labia minora** – encloses the vestibule
- **mammary glands (breasts)** – lactation (secretion of milk)

  NOTE: Lactiferous ducts carry secretions from many lobules to one opening in the nipple.

- **mons pubis** – protects the pubic bone
- **ovaries** – primary female reproductive organs; produces an ovum, usually once a month, and hormones
- **perineum** – forms the pelvic floor

  NOTE: The term perineum is clinically used to mean the area between the vaginal orifice and the anus. The full use of the term, however, includes all structures between the mons pubis and the coccyx.
- **urinary meatus** – external opening of the urethra
- **uterus** – protects and nourishes fertilized ovum until it becomes a viable infant; responsible for menstrual cycle
- **vagina** – receives the penis during copulation; passageway for the infant during birth and for menses
- **vaginal orifice** – the opening of the vagina
- **vestibule** – triangular area from clitoris to the base of the vaginal orifice

OBJECTIVE 8 **Distinguish among stages of the 28-day menstrual cycle.**


Growth of a follicle
Graafian follicle
Ovulation
Corpus luteum
In pregnancy, uterine lining continues to thicken
Menstruation/Ovulation
Thickness of uterine lining (mm)
5
4
3
2
1
0
1 to 5 days
6 to 14 days
15 to 20 days
21 to 28 days
1 to 5 days
Menstruation
Rebuilding of the uterine lining, coiled arteries and glands
Menstruation

Stage 1	**Days one through five** – Usually menstruation occurs, and one of the many ova enclosed in a follicle begins to mature
Stage 2	**Days five through thirteen** – The Graafian follicle produces estrogen under the control of the pituitary gland and the endometrium repairs and begins to thicken
Stage 3	**By day fourteen** – Ovulation occurs; Graafian follicle ruptures, and ovum is released into the abdominal cavity; fringed end of fallopian tube brings ovum into tube where it is propelled to uterus. If fertilization occurs, the ovum is penetrated by a sperm usually midway through the fallopian tube.
Stage 4	**Days fifteen through twenty** – Corpus luteum forms, secreting progesterone; endometrium thickens. If fertilization does not occur, the corpus luteum and its secretions diminish; the blood supply to the endometrium decreases; and the uterine capillaries begin to bleed as the endometrium sloughs off.
Stage 5	**Days twenty-one through twenty-eight** – Hormone production decreases; endometrium shrinks

1 – First day of menses; start of cycle

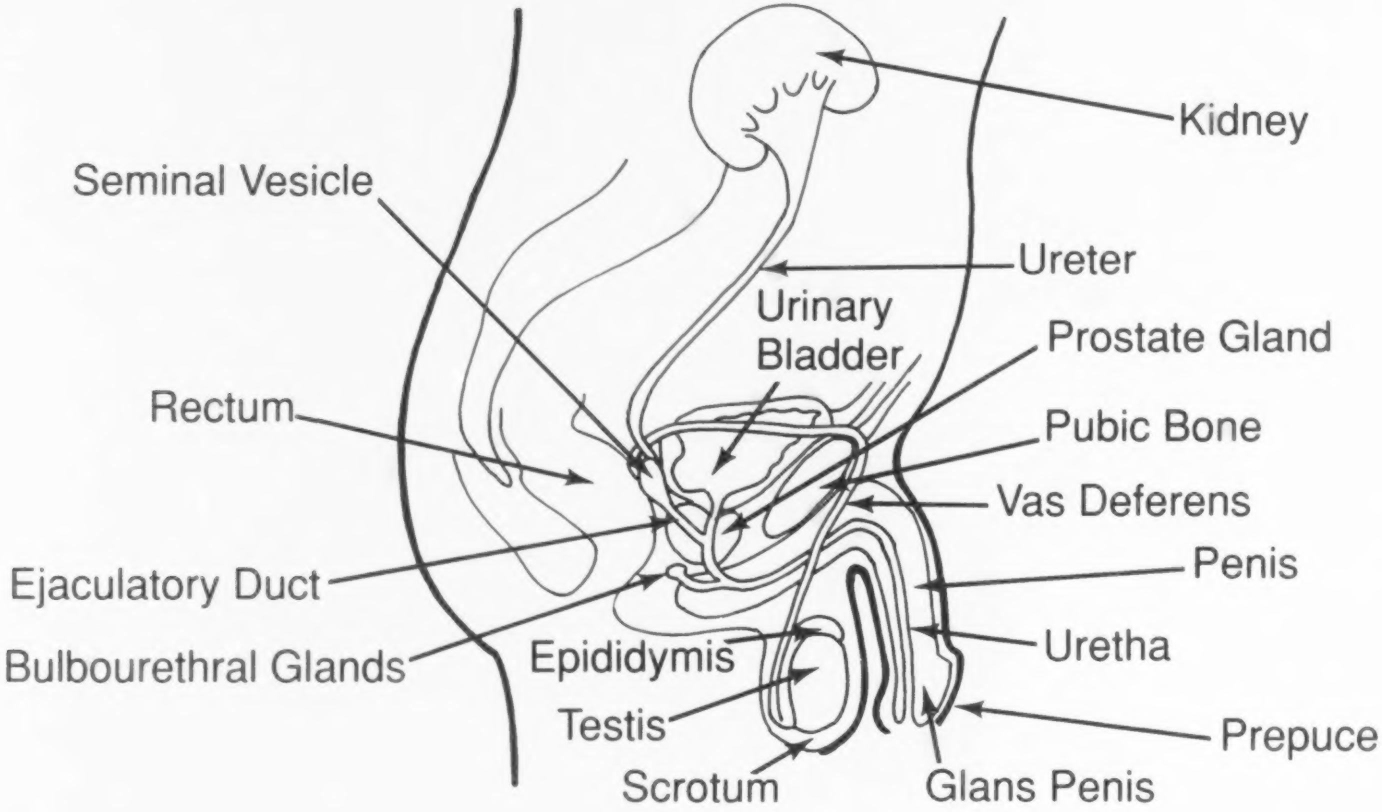
14 – Probable day of ovulation

28 – End of cycle; new cycle begins with menses

OBJECTIVE 9 **Describe physiological changes occurring during menopause.**

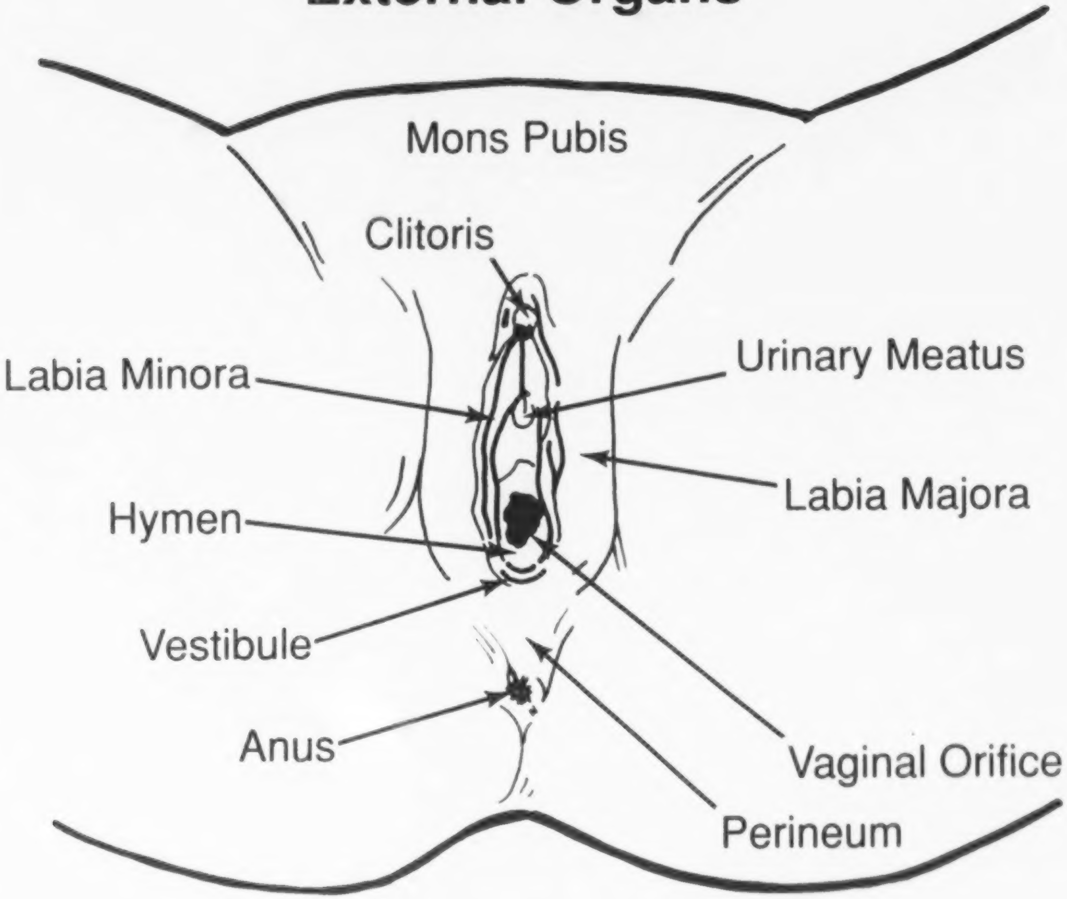
- Production of estrogen diminishes when ovaries atrophy and become scar tissue.
- Lack of estrogen causes the uterus, fallopian tubes, vagina, and vulva to atrophy.

Male Reproductive System


Kidney
Seminal Vesicle
Ureter
Urinary Bladder
Prostate Gland
Rectum
Pubic Bone
Vas Deferens
Penis
Ejaculatory Duct
Uretha
Bulbourethral Glands
Epididymis
Testis
Prepuce
Scrotum
Glans Penis

Female Reproductive System

External Organs

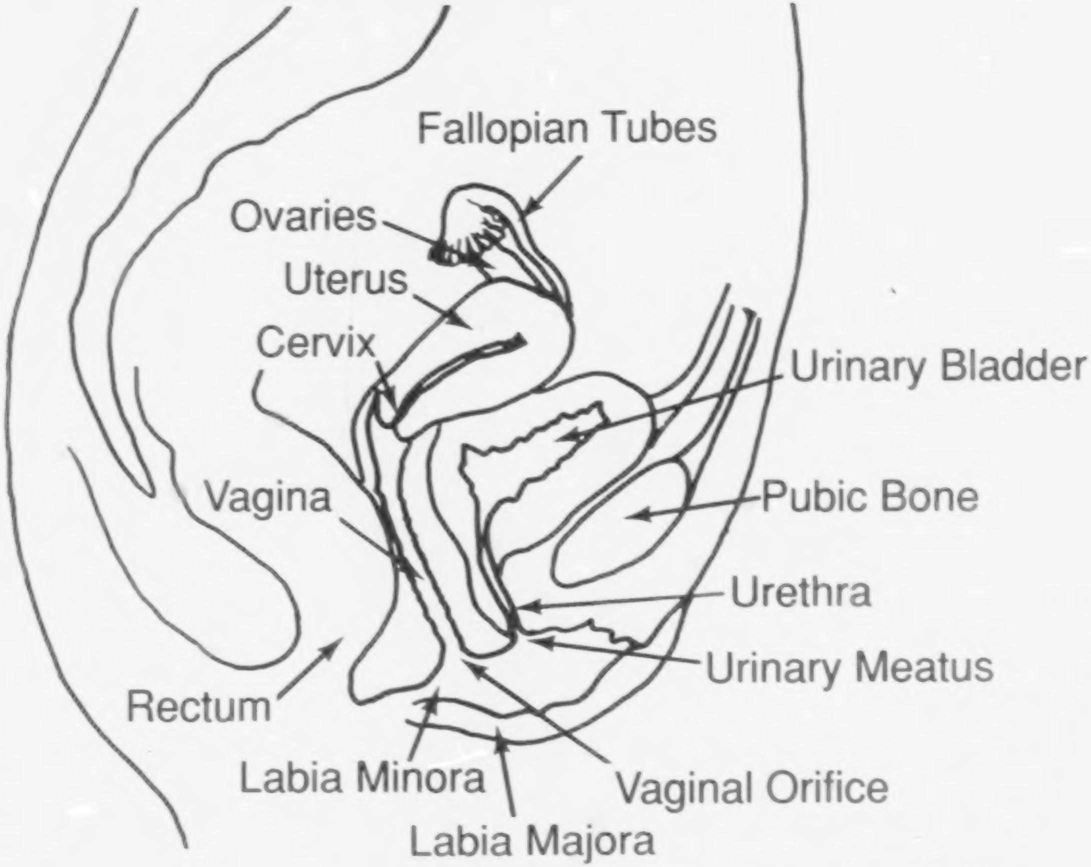

Mons Pubis
Clitoris
Labia Minora
Urinary Meatus
Labia Majora
Hymen
Vestibule
Anus
Vaginal Orifice
Perineum

TRANSPARENCY MASTER 2 - Body Structure and Function
CIMC · XVII · 21

TM 2

Female Reproductive System

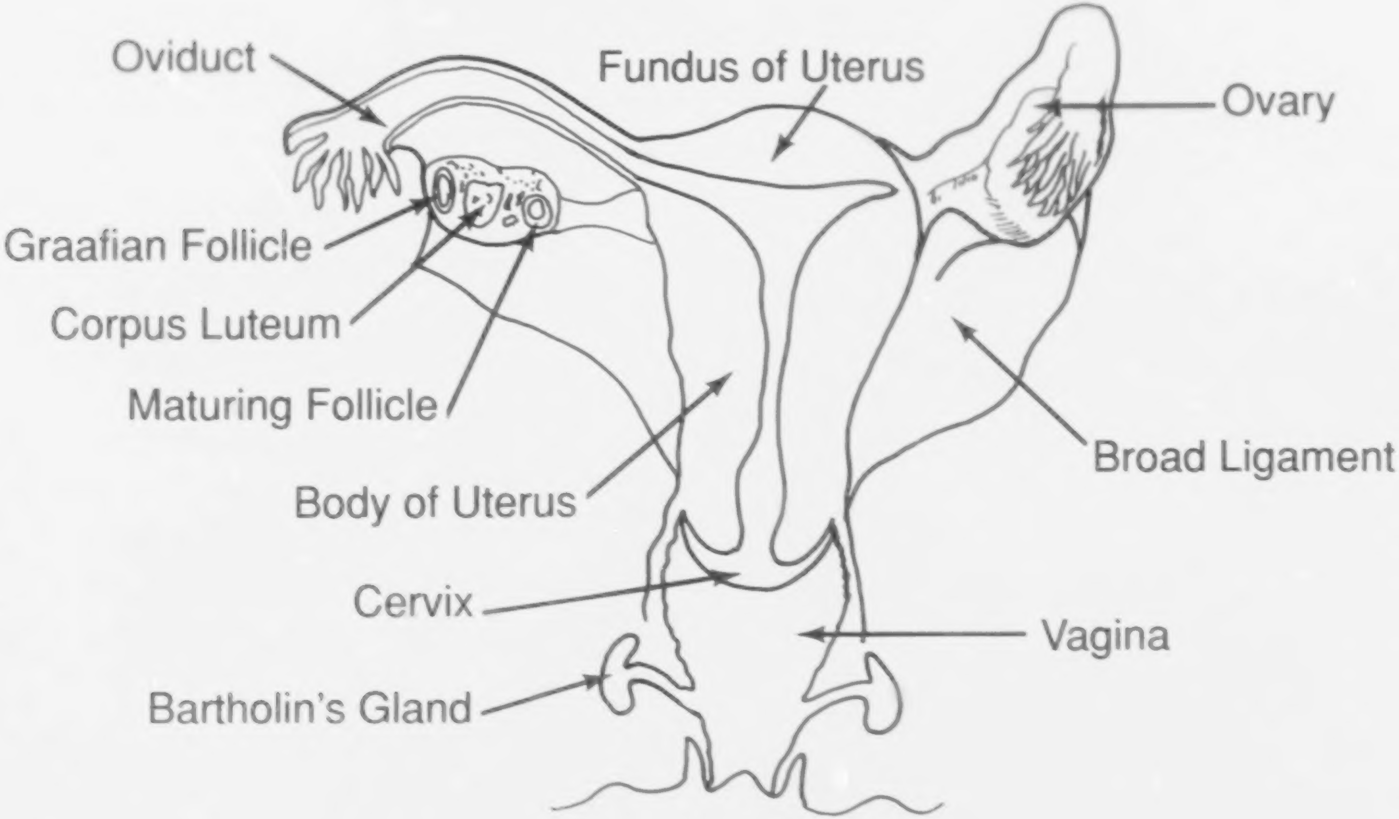
Internal Organs


Fallopian Tubes
Ovaries
Uterus
Cervix
Urinary Bladder
Vagina
Pubic Bone
Urethra
Urinary Meatus
Rectum
Labia Minora
Vaginal Orifice
Labia Majora

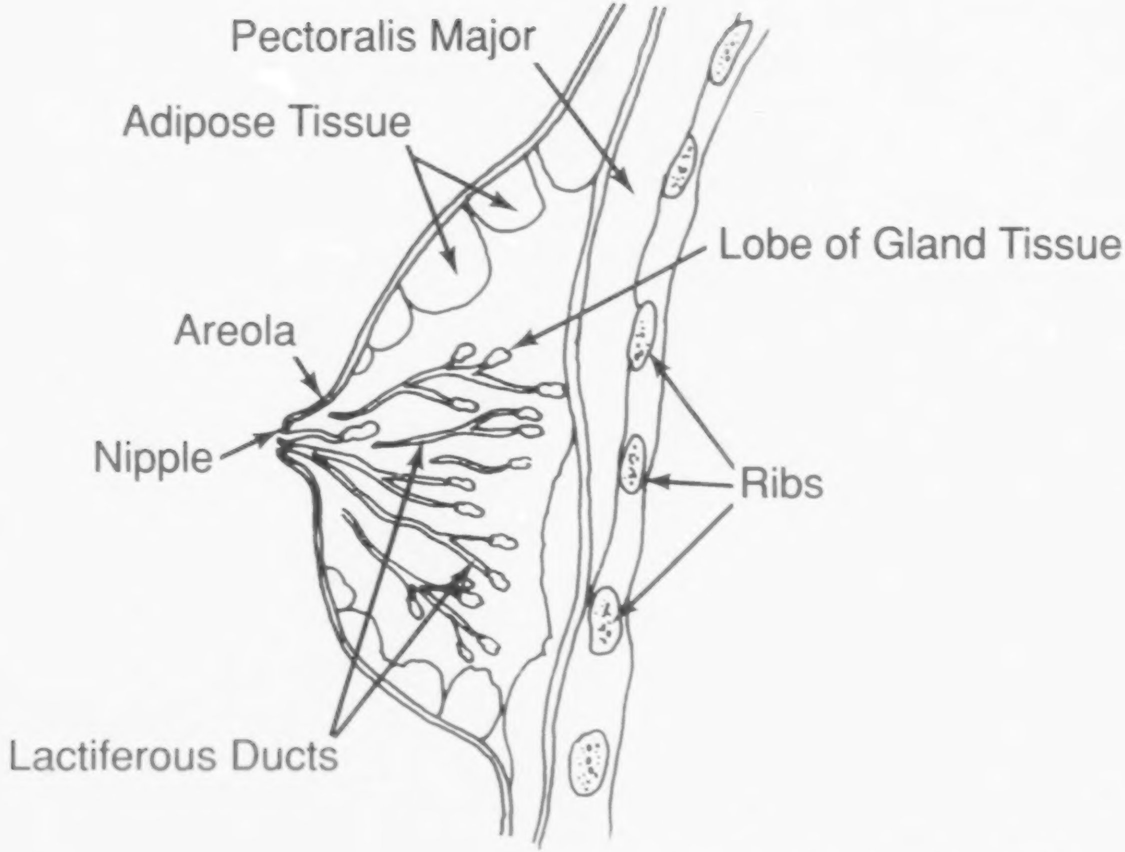
TRANSPARENCY MASTER 3 · Body Structure and Function
CIMC · XVII - 23

Female Reproductive System

Uterus and Fallopian Tubes

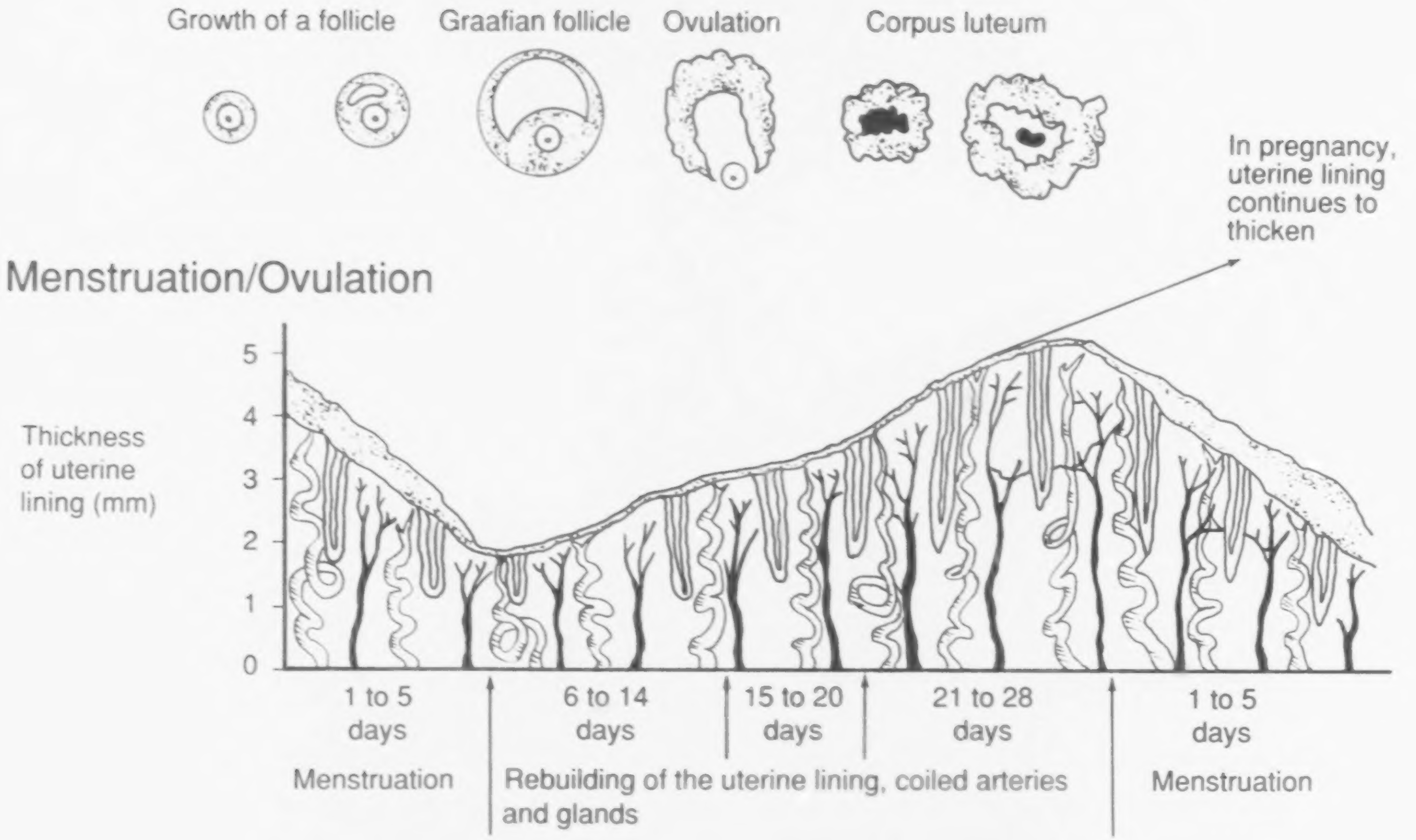

Oviduct
Fundus of Uterus
Ovary
Graafian Follicle
Corpus Luteum
Maturing Follicle
Body of Uterus
Broad Ligament
Cervix
Vagina
Bartholin's Gland

The Breast


Pectoralis Major
Adipose Tissue
Lobe of Gland Tissue
Areola
Nipple
Ribs
Lactiferous Ducts

TRANSPARENCY MASTER 5 Body Structure and Function
CIMC XVII - 27

The Menstrual Cycle

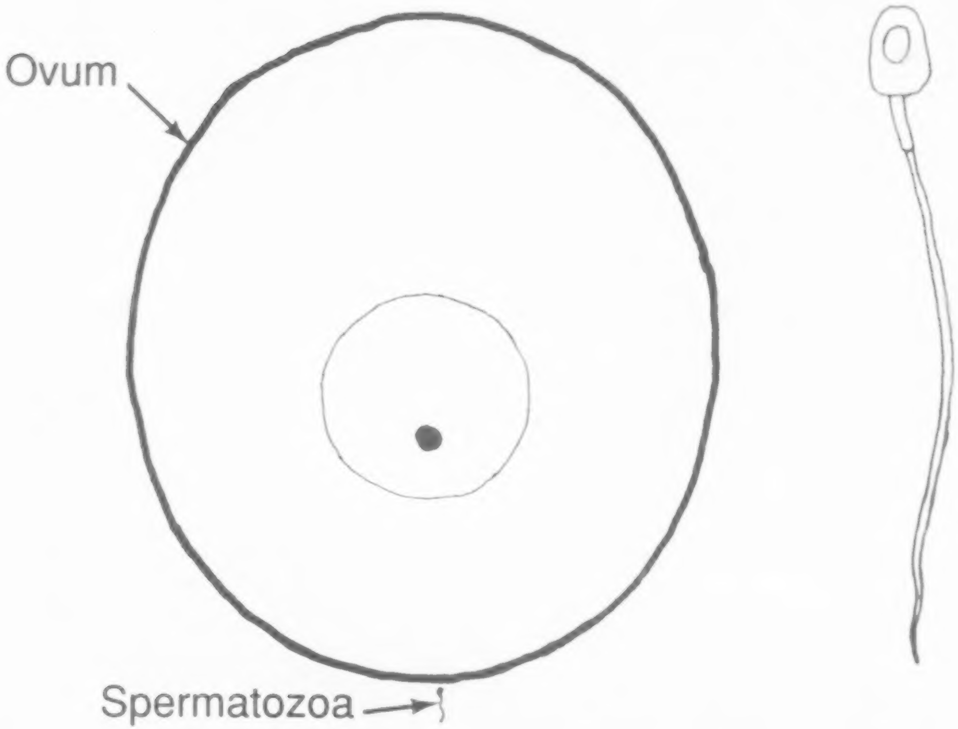

Growth of a follicle
Graafian follicle
Ovulation
Corpus luteum
In pregnancy, uterine lining continues to thicken
Menstruation/Ovulation
Thickness of uterine lining (mm)
0
1
2
3
4
5
1 to 5 days
6 to 14 days
15 to 20 days
21 to 28 days
1 to 5 days
Menstruation
Rebuilding of the uterine lining, coiled arteries and glands
Menstruation

DAYS INDICATED ARE APPROXIMATE

TRANSPARENCY MASTER 6 Body Structure and Function
CIMC · XVII · 29

TM 6

Ovum and Spermatozoa



NOTE MARKED DIFFERENCE IN SIZE
OF SPERMATOZOA AND OVUM
SPERMATOZOA ON RIGHT GREATLY ENLARGED

TRANSPARENCY MASTER 7 Body Structure and Function
CIMC XVII 31

ACTIVITY SHEETS 1–3

Development of:
READING SKILLS
SCIENCE SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS

- Introduce the assignment to the students by discussing why reading and science skills are important.

- Discuss with them the following skills which are relevant to this task:

  READING SKILLS

  - Interpret graphics and symbols

  SCIENCE SKILLS

  - Investigate/apply principles of anatomy/physiology

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Analyze/synthesize information

- If students have difficulty interpreting graphics and symbols:

  - Remind them that interpreting a graphic is very similar to reading a page. Each part of the graphic or symbol has a meaning within the art.

  - Suggest that, when they have a graphic, chart, diagram, or table to interpret, they should carefully study the art and compare it to any similar pieces encountered. Also study the key or any other information that will help you understand the meaning of the graphic.

- If students have difficulty investigating/applying the principles of anatomy/physiology, remind them that it is important in any area of work or study to have consistent ideas or principles that everyone uses. Explain that sometimes it is necessary to express these in graphic format so that it will be easy for people to relate them to the body.

- If students have difficulty analyzing/synthesizing information:

- Explain that it is usually necessary to learn about complex items or things by examining their make-up or parts, such as studying body structure by examining each individual system or studying auto mechanics by examining the different automobile systems.

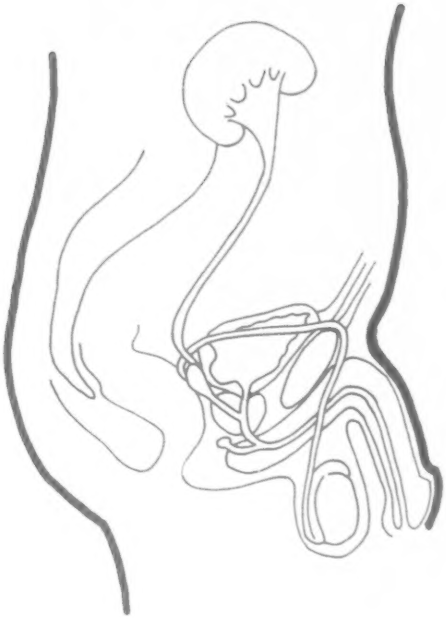
- Also explain that it is sometimes necessary to then study the whole item or thing by studying how the parts work together to make the whole item work. This examination helps us identify and compare the relationships the parts have with each other.

- Help the students understand the concepts by asking what they would do if they turned on a light and nothing happened. Lead them to discuss that they would probably first check to see if the light was plugged in or if the bulb was burned out. Plugging it in or replacing the light bulb might make the light come back on.

- Then ask the students what they would do if the light still didn't work. Lead them to the conclusion that they should check to see if all the electricity was off. If it is, they will have to think about what they know about the whole electrical system–what are its parts. Identifying the parts of the whole will help them recognize the problem.

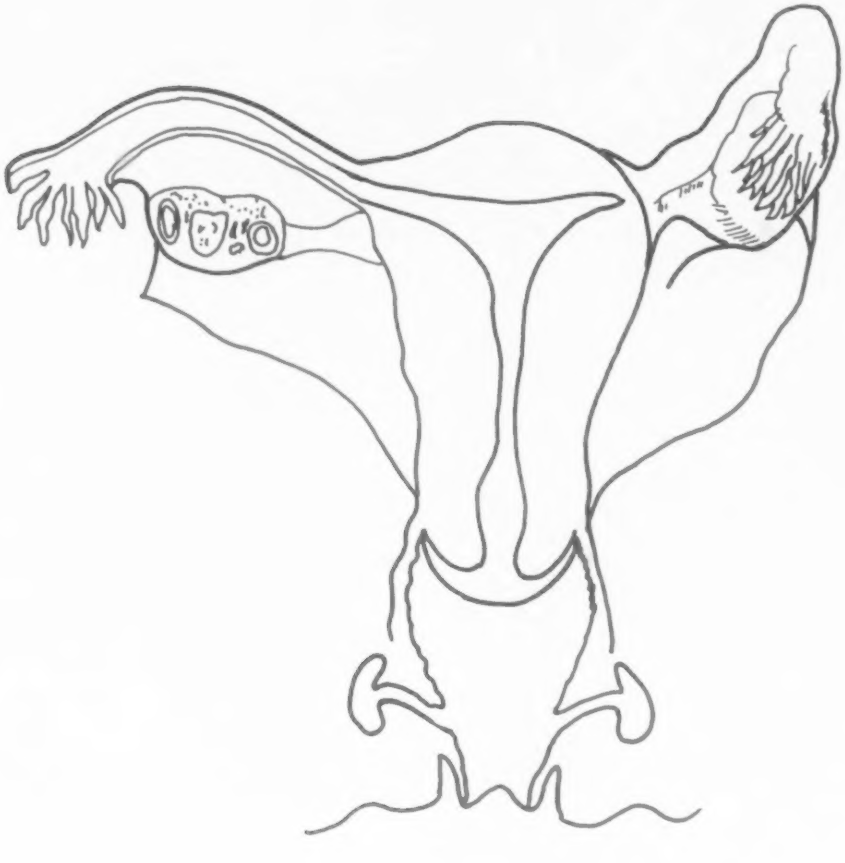
TRACE THE PATH OF A SPERMATOZOA

Use the artwork below to trace the path of a spermatozoa and label all organs.



TRACE THE PATH OF AN OVUM

Use the artwork below to trace the path of an ovum. Indicate the normal point of fertilization and label all organs.



859

CHART THE MENSTRUAL CYCLE

Make a poster showing the phases of the menstrual cycle. Indicate hormonal changes, actions of the ovum, and chances of fertilization. Be sure your work meets HOSA guidelines. Present your poster to the class.

ASSIGNMENT SHEET

Development of:
WRITING SKILLS
ORAL COMMUNICATION SKILLS
CREATIVE THINKING/PROBLEM SOLVING SKILLS
EMPLOYABILITY SKILLS

- Introduce the assignment to the students by discussing why writing, oral communication, employability, and creative thinking/problem solving skills are important.

- Discuss with them the following skills which are relevant to this task:

  WRITING SKILLS

  - Use standard grammar and correct spelling, punctuation, and capitalization

  - State ideas clearly

  ORAL COMMUNICATION SKILLS

  - Use effective body language

  - Adapt presentation to specific audience

  CREATIVE THINKING/PROBLEM SOLVING SKILLS

  - Create a finished product

  EMPLOYABILITY SKILLS

  - Developing effective leadership

- If students have difficulty using standard grammar and correct spelling, punctuation, and capitalization:

  - Discuss with the students why it is important to use standard grammar and correct spelling, punctuation, and capitalization. The discussion should include that it is difficult to read and understand incorrectly-written materials and that correctly-written items will be taken more seriously by readers.

  - As you read items written by the students, make a list of the most common grammar, punctuation, and capitalization errors. Review these with the class or with the individuals.

  - Help the students develop a checklist to use as they write, edit, and proofread. Each student can personalize his or her own checklist by adding the items that present the most problems to him or her. If spelling is a problem, suggest keeping a personal dictionary of frequently used or misspelled words. Remind them to add any words they misspell to their dictionaries.

  - Have the students work with partners or in groups and review each others' writing. Allow time for the students to discuss the comments with their partners or groups.

  - Suggest that as the students write or proofread their own writing, they circle or mark places where they are unsure of the correct grammar, punctuation, capitalization, or spelling. Provide materials (English grammar/mechanics books or style guides) or class time for the students to use to review, revise, or correct their writing.

- If students have difficulty stating ideas clearly:

  - Remind the students to decide in advance what ideas they want to convey and who their audience is. Knowing about the intended audience is important because it helps determine how to present the ideas most clearly.

  - Explain that as they do their research, they should begin to decide how to best present their ideas to their audience. Some possible methods include written reports, charts, graphs, diagrams, etc. Remind them that the intended audience should influence how the material is presented (very simple with lots of pictures for children, a great deal of background information for people who know a little or nothing about the subject, and little background with more complex information for experts).

  - Have the students work with a partner or in a small group. Provide time for the students to share their ideas with each other and make suggestions as to ways to make the ideas more clear.

  - Remind the students that careful preplanning and the use of correct grammar, spelling, punctuation, and capitalization are especially important if their ideas are to be clearly understood by the intended audience.

- If students have difficulty using effective body language:
  - Remind the students that sometimes body language says as much as, or more than, the words you use. Have them discuss or demonstrate what they know about body language.
  - Remind them that it is very important to convey the appropriate message when making oral presentations. Have a volunteer demonstrate body language that says "I am confident; I know what I'm talking about and should be listened to."
  - Discuss how body language is used in skits and mime to convey the appropriate meaning.
- If students have difficulty adapting their presentation to a specific audience:
  - Remind them that one of the first steps in planning and making successful presentations is identifying who the intended audience is and how to best present to that intended audience.
  - Have the class discuss ways to adapt material to different audiences by naming a topic (such as football) and an audience (a high school football team, a group of foreign visitors who have never even seen a football game, a group of adults who have seen football games but want to know more about it) and asking for suggestions as to how to best adapt the presentation. Let the group name other topics and audiences to discuss.
- If students have difficulty creating a finished product:
  - Have them to go back to the beginning and reidentify what it was they wanted to accomplish. Have them ask themselves how they intended to accomplish this and why it has been difficult to accomplish. Have them decide if their original idea is "do-able" or if they should decide on a new final product that they will be able to complete.
  - Be sure that the student realize that one of the most important aspects of creating a finished product is the planning of the desired finished product.
- If students have difficulty developing effective leadership:
  - Have the class discuss traits that make a person an effective leader.

863

- Remind the students that an effective leader does not boss people needlessly or order other people to do his or her work–an effective leader is a person who can get a task finished by combining his or her talents with the talents of the other people to best complete a project. It is a person who can both suggest ideas and listen openly to the ideas of others. It is a person who can make an educated decision when necessary to the success of the project.

- Provide students with opportunities to develop leadership skills by dividing the class into groups to plan and complete the assignment sheet activity or any other appropriate activity.

- Work with the groups to ensure that each student has the opportunity and the information needed to lead one phase of the assignment.

864

ASSIGNMENT SHEET

THE REPRODUCTIVE SYSTEM XVII

Name ________________________________ Score ____________

OBJECTIVE 10

Communicate about how the reproductive system functions.

INTRODUCTION

The reproductive system has always received a great deal of public attention. The first doctors were midwives. Today, AIDS and teenage pregnancy as well as other reproduction-related topics are often featured in the press. As health care workers, it is important for you to understand how the reproductive system functions.

DIRECTIONS

Select one aspect of the reproductive system. Create a poster, a poster, pamphlet, brochure, oral report, or skit on the topic. Present your project to the class.

Language Skills
- Use standard grammar, spelling, and capitalization
- State ideas clearly

Oral Presentation Skills
- Use effective body language
- Adapt presentation to specific audience

Cognitive Activities Skills
- Create a finished product (written and oral)

Job Acquisition/ Development Skills
- Develop effective leadership

THE REPRODUCTIVE SYSTEM *XVII*

ASSIGNMENT SHEET

The project should be current and accurate. All HOSA guidelines should be met. Proper terminology should be used; meanings should be clear to lay people as well as health care professionals. Personal bias should be avoided.

WRITTEN TEST

THE REPRODUCTIVE SYSTEM XVII

Name ______________________________ Score ____________

OBJECTIVE 1

Match terms associated with the reproductive system to their definitions. Write the correct letters in the blank.

Part I

_____ 1. Mucous membrane lining of the uterus

_____ 2. Area between external genitalia and anus

_____ 3. The head of the penis

_____ 4. Pertaining to the ox pubis, the anterior bone of the pelvis

_____ 5. Cord that extends from the testes and surrounds the veins, arteries, lymphatics, nerves, and vas deferens

_____ 6. Capable of maintaining an independent existence

_____ 7. External pouch that contains the testes

_____ 8. Period at which one becomes capable of reproduction

_____ 9. Ducts that pass milk through the nipple

_____ 10. External female genitalia

a. broad ligament

b. climactic

c. endometrium

d. glans penis

e. gonad

f. lactiferous ducts

g. obstetrics

h. perineum

i. puberty

j. pubic

k. reproduction

l. spermatic cord

m. scrotum

n. viable

o. vulva

May be photocopied for student use.

Part II

_____ 1. The fold of peritoneum that supports the uterus

_____ 2. Period that marks the cessation of the reproductive function in the female or diminishing testicular activity in the male

_____ 3. Mature ovarian follicle

_____ 4. Periodic discharge of blood and tissues from the non-pregnant uterus

_____ 5. Thick, white secretion of the male reproduction gland

_____ 6. Beginning of menstruation

_____ 7. The process by which the sperm unites with the ovum

_____ 8. Thick, sticky

_____ 9. Process by which a living organism produces a new individual of the same kind

_____ 10. Surgical removal of the prepuce

a. broad ligament

b. circumcision

c. climacteric

d. endometrium

e. fertilization

f. glans penis

g. graafian follicle

h. gynecology

i. menarche

j. menstruation

k. obstetrics

l. reproduction

m. semen

n. viable

o. viscid

May be photocopied for student use.

Part III

_____ 1. Organ that produces male or female reproductive cells–ovaries in females, testes in males

_____ 2. Normal condition when the production of the ovum ceases, resulting in permanent cessation of menstrual activity

_____ 3. Foreskin or fold of skin over the glans penis

_____ 4. Female reproductive cell

_____ 5. Study of the female reproductive system

_____ 6. Male reproductive cell

_____ 7. Branch of medicine that deals with management of pregnancy, labor, delivery, and post-partum care

_____ 8. Monthly flow of uterine lining

_____ 9. Physical changes related to gender, but not involved in reproduction (men's beards, voice change)

a. broad ligament
b. circumcision
c. gonad
d. gynecology
e. lactiferous ducts
f. menopause
g. menses
h. obstetrics
i. ovum
j. prepuce
k. secondary sex characteristics
l. spermatozoa
m. viscid

OBJECTIVE 2 **List functions of male and female reproductive systems.**

______________________ ______________________

____

____

May be photocopied for student use.

OBJECTIVE 3 **Select from a list secondary sex characteristics in males and females.** Write an "X" in the blank before each correct sex characteristic.

Male

_____ 1. Increase in activity of sudoriferous and sebaceous glands

_____ 2. Scrotum "drops"

_____ 3. Change in voice to deeper tones

_____ 4. Growth of beard, pubic, and axillary hair with general increase of hair growth all over body

_____ 5. Enlargement of hands and feet

_____ 6. Change in musculoskeletal development with broader shoulders, narrow hips, and firmer muscles

Female

_____ 1. Menarche

_____ 2. Change in body contours due to increase in growth and fatty deposits

_____ 3. Increase in activity of the sudoriferous and sebaceous glands

_____ 4. Change in musculoskeletal development with firmer muscles

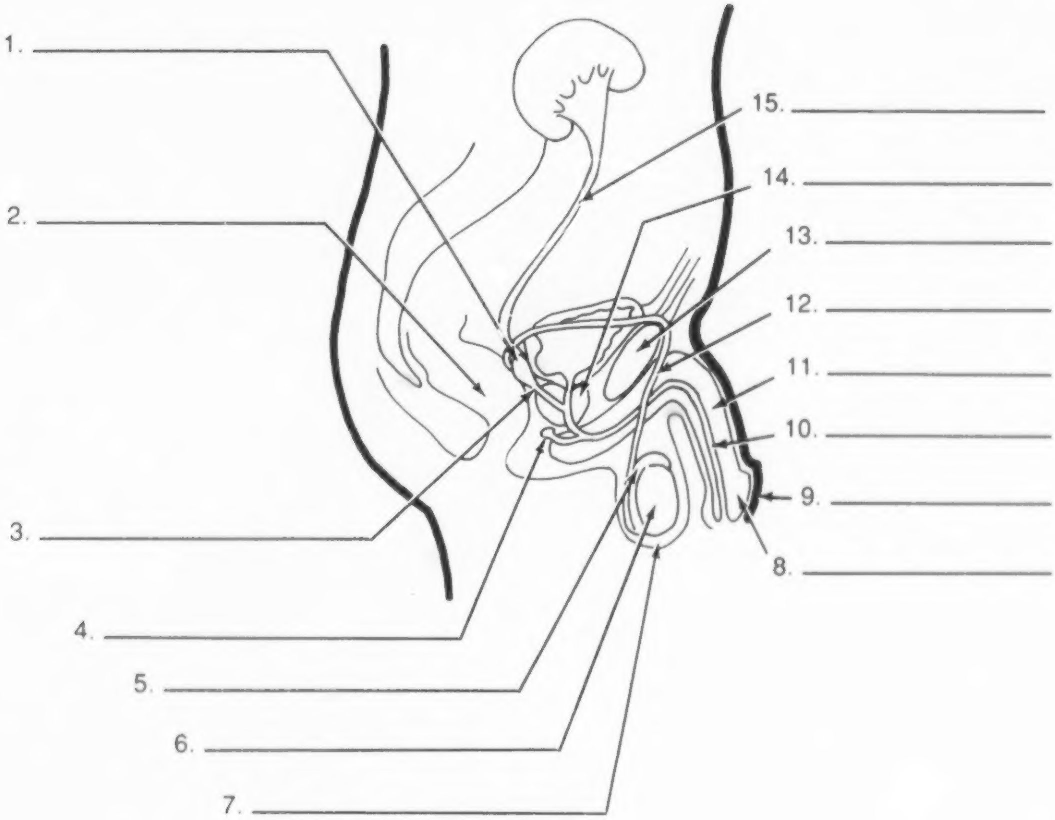
_____ 5. Enlargement of breasts

_____ 6. Appearance of pubic and axillary hair

870

May be photocopied for student use.

OBJECTIVE 4 | **Label parts of the male reproductive system and adjacent structures.** Write the correct name in the blank.


1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ____________
11. ____________
12. ____________
13. ____________
14. ____________
15. ____________

May be photocopied for student use

OBJECTIVE 5

Match male reproductive structures to their functions. Write the correct letter in the blank.

_____ 1. Paired glands that produce sperm and testosterone

_____ 2. Collects and stores sperm while they mature; conducts sperm to the vas deferens

_____ 3. Secretes clear, viscid, alkaline fluid which removes urine residue and serves as a lubricant

_____ 4. Carries semen into vagina during copulation, carries urine from bladder

_____ 5. Transports sperm from the epididymis to the urethra; contracts its smooth muscles to aid ejaculation

_____ 6. Secretes alkaline fluids which enhance sperm mobility

_____ 7. Contribute essential components to semen

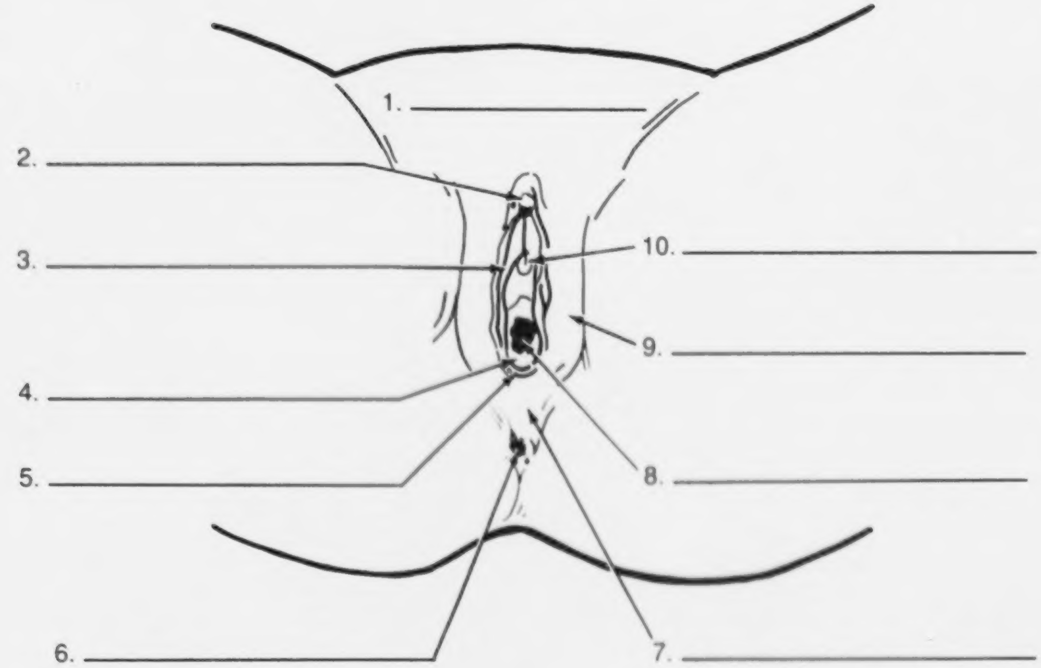
_____ 8. Sac that contains the testes and helps regulate and maintain favorable temperature for sperm production and survival

_____ 9. Part of the testes that produce sperm

a. bulbourethral or Cowper's gland
b. circumcision
c. epididymis
d. glans penis
e. meatus
f. penis and urethra
g. prostate gland
h. scrotum
i. seminal vesicles
j. seminiferous tubules
k. spermatozoa
l. testes
m. vas deferens

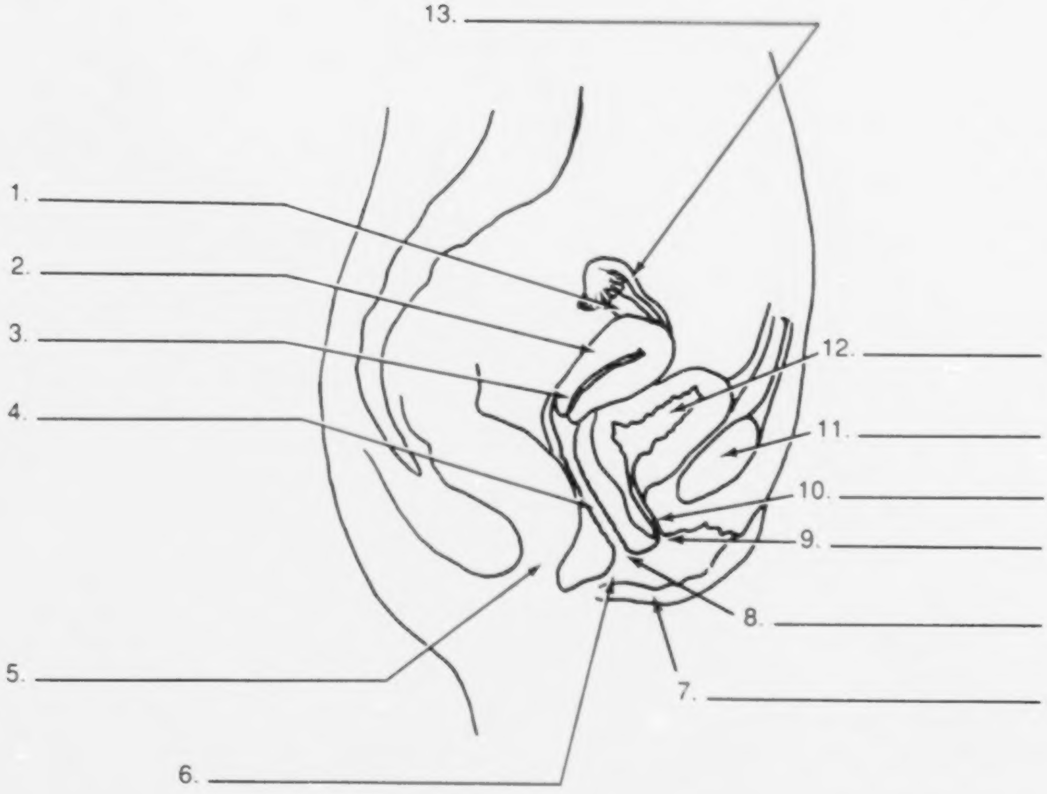
May be photocopied for student use

OBJECTIVE 6 **Label parts of the female reproductive system and adjacent structures.** Write the correct name in the blank.

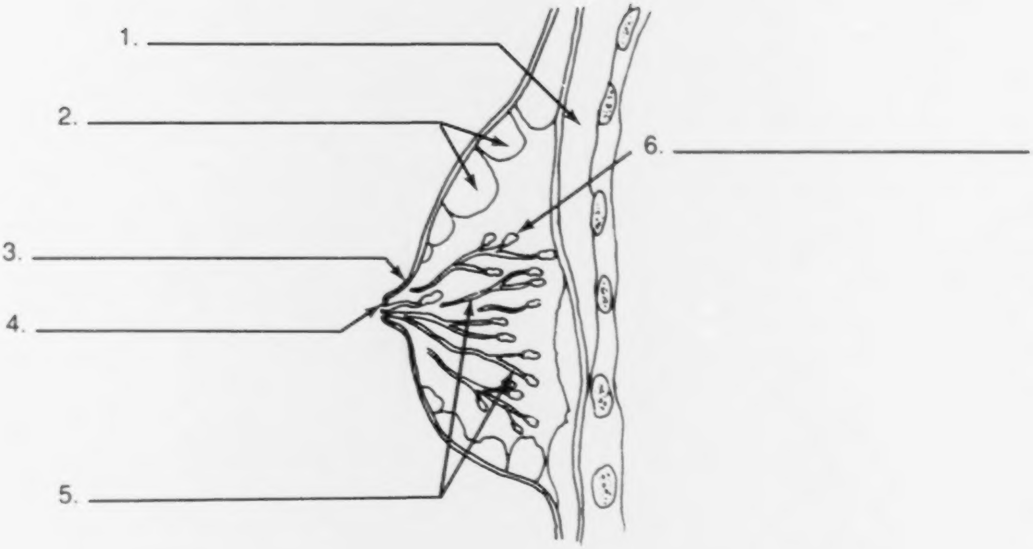


873

May be photocopied for student use.


13.
1.
2.
3.
12.
4.
11.
10.
9.
8.
5.
7.
6.

May be photocopied for student use



May be photocopied for student use

OBJECTIVE 7

Match female reproductive structures to their functions. Write the correct letter in the blank.

Part I

_____ 1. Primary female reproductive organs; produces an ovum, usually once a month, and hormones

_____ 2. Pathway for movement of the ova from ovaries to uterus

_____ 3. External opening of the urethra

_____ 4. Produces sexual excitement

_____ 5. Triangular area from clitoris to the base of the vaginal orifice

_____ 6. Lactation (secretion of milk)

_____ 7. The opening of the vagina

a. clitoris
b. fallopian tubes
c. mammary gland (breasts)
d. mons penis
e. ovaries
f. urinary meatus
g. uterus
h. vagina
i. vaginal orifice
j. vestibule

May be photocopied for student use

Part II

_____ 1. Surrounds labia minora

_____ 2. Protects and nourishes fertilized ovum until it becomes a viable infant; responsible for menstrual cycle

_____ 3. Secrete lubricating fluid

_____ 4. Protects the pubic bone

_____ 5. Receives the penis during copulation; passageway for the infant during birth and for menses

_____ 6. Forms the pelvic floor

_____ 7. Encloses the vestibule

a. Bartholin's and Skene's glands

b. clitoris

c. fallopian tubes

d. labia majora

e. labia minora

f. mons penis

g. ovaries

h. perineum

i. uterus

j. vagina

OBJECTIVE 8

Distinguish among stages of the 28-day menstrual cycle. Write a "1" in the blank before occurrences during the first stage of the menstrual cycle, a "2" in the blank before occurrences during the second stage, etc.

_______1. Fringed end of fallopian tube brings ovum into tube where it is propelled to uterus.

_______2. Usually menstruation occurs.

_______3. The Graafian follicle produces estrogen under the control of the pituitary gland.

_______4. If fertilization occurs, the ovum is penetrated by a sperm usually midway through the fallopian tube.

_______5. Corpus luteum forms, secreting progesterone; endometrium thickens.

_______6. Graafian follicle ruptures, and ovum is released into the abdominal cavity.

_______7. One of the many ova enclosed in a graafian follicle begins to mature.

May be photocopied for student use.

______8. If fertilization doesn't occur, uterine capillaries begin to bleed as the endometrium sloughs off.

______9. The endometrium repairs and begins to thicken

_____10. If fertilization does not occur, the corpus luteum and its secretions diminish.

_____11. Endometrium shrinks.

_____12. If fertilization doesn't occur, blood supply to the endometrium decreases.

_____13. Hormone production decreases.

_____14. Ovulation occurs.

OBJECTIVE 9 **Describe physiological changes occurring during menopause.**

____

____

____

____

____

____

____

NOTE: Objective 10 is evaluated on job sheets/assignment sheets in this unit. If you have not completed these components, see your instructor.

May be photocopied for student use.

WRITTEN TEST ANSWERS

THE REPRODUCTIVE SYSTEM

XVII

OBJECTIVE 1

Part I		Part II		Part III	
1.	c	1.	a	1.	c
2.	h	2.	c	2.	f
3.	d	3.	g	3.	j
4.	j	4.	j	4.	i
5.	l	5.	m	5.	d
6.	n	6.	i	6.	l
7.	m	7.	e	7.	h
8.	i	8.	o	8.	g
9.	f	9.	l	9.	k
10.	o				

OBJECTIVE 2

- Perpetuation of the human species
- Sexual gratification
- Secretion of hormones

OBJECTIVE 3

Males – 1, 3, 4, 6

Females – 1, 2, 5, 6

OBJECTIVE 4

1. Seminal vesicle
2. Rectum
3. Ejaculatory duct
4. Bulbourethral glands
5. Epididymis
6. Testis
7. Scrotum
8. Glans penis
9. Prepuce
10. Urethra
11. Penis
12. Vas Deferens
13. Pubic bone

14. Prostate gland
15. Urinary bladder

OBJECTIVE 5

1. l
2. c
3. a
4. f
5. m
6. g
7. i
8. h
9. j

OBJECTIVE 6

External organs:
1. Mons pubis
2. Clitoris
3. Labia minora
4. Hymen
5. Vestibule
6. Anus
7. Perineum
8. Vaginal orifice
9. Labia majora
10. Urinary meatus

Internal organs:
1. Ovaries
2. Uterus
3. Cervix
4. Vagina
5. Rectum
6. Labia minora
7. Labia majora
8. Vaginal orifice
9. Urinary meatus
10. Urethra
11. Pubic bone
12. Urinary bladder
13. Fallopian tubes

The breast:
1. Pectoralis major
2. Adipose tissue
3. Areola
4. Nipple
5. Lactiferous ducts
6. Lobe of gland tissue

OBJECTIVE 7

Part I		Part II	
1.	e	1.	d
2.	b	2.	i
3.	f	3.	a
4.	a	4.	f
5.	j	5.	j
6.	c	6.	h
7.	o	7.	e

OBJECTIVE 8

1.	3	6.	3	11.	5
2.	1	7.	1	12.	4
3.	2	8.	4	13.	5
4.	3	9.	2	14.	3
5.	4	10.	4		

OBJECTIVE 9

Discussion should include:

- Production of estrogen diminishes when ovaries atrophy and become scar tissue.
- Lack of estrogen causes the uterus, fallopian tubes, vagina, and vulva to atrophy.